AAG5

TC-K80II

AEP Model
Canadian Model
E Model

AEP, E model

STEREO CASSETTE DECK

SPECIFICATIONS

GENERAL

Power Requirements:
120 V ac, 60 Hz (Canadian model)
220 or 240 V ac ~, 50/60 Hz (AEP model)
110, 120, 220, 240 V ac adjustable, 50/60 Hz (E model)

Power Consumption:
27 W (Canadian model)
30 W (AEP, E model)

AC Outlet:
1 unswitched, 300 W (Canadian model)

Dimensions:
Canadian model:
Approx.
460 (w) x 160 (h) x 295 (d) mm
18⅛ (w) x 6 ¼ (h) x 11⅝ (d) inches
AEP, E model:
Approx.
430 (w) x 160 (h) x 295 (d) mm
17 (w) x 6¼ (h) x 11⅝ (d) inches
Including projecting parts and controls

Weight:
Approx. 9.2 kg, 20 lb 5 oz (Canadian model)
Approx. 8.5 kg, 18 lb 12 oz (AEP, E model)

Track:
4-track 2-channel stereo

Fast Forward and Rewind Time:
Approx. 80 seconds with Sony cassette C-60

Overall Frequency Response:
DOLBY NR OFF:
With TYPE IV cassette (Sony METALLIC)
20 – 19,000 Hz
30 – 17,000 Hz (± 3 dB)
30 – 13,000 Hz (± 3 dB, 0VU recording)
With TYPE III cassette (Sony Fe-Cr)
20 – 19,000 Hz
30 – 17,000 Hz (± 3 dB)
With TYPE II cassette (Sony EHF)
20 – 18,000 Hz
30 – 16,000 Hz (± 3 dB)

– Continued on page 2 –

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE TRAME ET UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

SONY®

SERVICE MANUAL

TC-K80 II

With TYPE I cassette (Sony HFX)
20 – 16,000 Hz
30 – 14,000 Hz (±3 dB)

Wow and Flutter: 0.03 % (RMS) weighted (NAB)
± 0.1 % (DIN)

Overall S/N Ratio: DOLBY NR OFF:
60 dB at peak level with TYPE III cassette (Sony Fe-Cr)
58 dB at peak level with TYPE II cassette (Sony EHF)
DOLBY NR ON:
Improved by 5 dB at 1 kHz, 10 dB above 5 kHz

Overall Distortion: 0.9 % with Sony Fe-Cr cassette

Record Bias Frequency: 105 kHz

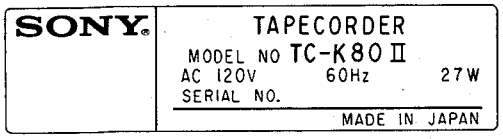
Inputs: MIC (two phone jacks)
Maximum sensitivity: 0.25 mV (–70 dB)
Impedance: for low-impedance microphone
LINE IN (two phono jacks)
Maximum sensitivity: 77.5 mV (–20 dB)
Impedance: 47 – 50 kΩ
REC/PB (connector) (AEP, E model)
Input impedance: 10 kΩ or less

Outputs: LINE OUT (two phono jacks)
Normal level: 0.435 V (–5 dB)
Load impedance: 50 kΩ
HEADPHONES (stereo-binaural jack)
Output level: 1.9 mV – 62 mV (–52 to –22 dB)
Load impedance: 8 Ω
REC/PB (connector) (AEP, E model)
Output impedance: 10 kΩ or less

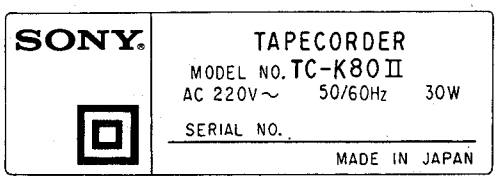
Liquid Crystal Peak Program Meters: Response range: –40 dB to +8 dB
Frequency response: 20 – 20,000 Hz ±1.5 dB
Response time: 1 millisecond
Decay time (from 0 dB to –20 dB): 750 milliseconds
Overshoot: None
Indicator elements: 33 elements for each channel

MODEL IDENTIFICATION (Specification Label)

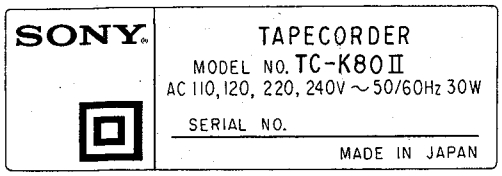
Canadian Model:



AEP Model:



E Model:



SECTION 1
OUTLINE

1-1. HANDLING PRECAUTIONS FOR MOS ICs (ICs 002, 101, 201, 801–803, 805, 806)

Generally, the insulation resistance of the oxide layer in MOS IC structures is very high, and the oxide layer is very thin. Because of this, it is possible that the static voltages usually present on clothes and the human body will be enough to generate a potential difference across the insulator, high enough to cause a breakdown of the insulating layer.

The following precautions should be taken while handling these ICs.

(Particular care should be taken under conditions of low humidity.)

Precautions in Replacing MOS ICs

1. Store new ICs by inserting them into a urethane-polyester cushion (which is somewhat conductive), or wrapping it in aluminum foil, so that all the pins are at the same potential.
   (The ICs should be stored in that manner until mounted on the circuit board.)

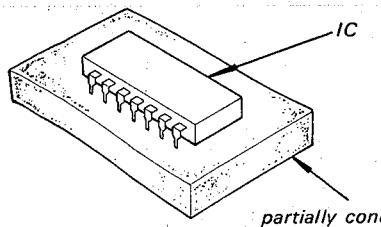


Fig. A

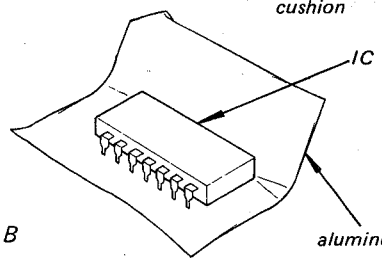


Fig. B

2. Check the soldering iron for possible power-line leakage current. Make sure that there is no leakage path by connecting an ohmmeter to the tip of the soldering iron and the plug as shown in Fig. C. If there is a leakage path, use some other soldering iron.

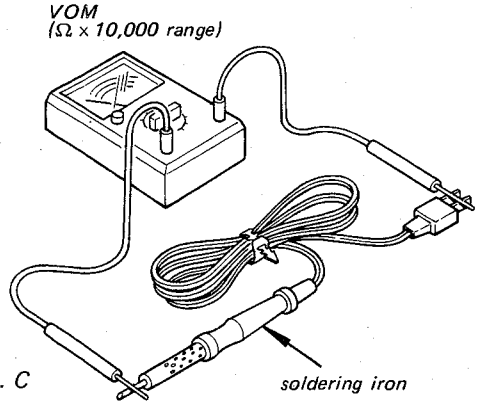


Fig. C

3. Equalize any potential difference between the clothes, the tools in use, the work bench, the set being worked on, and the packaged IC by touching them all in succession with the hands or a conductive wire or tool.
4. The following are effective methods for handling ICs that remove the potential difference across the oxide layer.
   - Use a paper clip modified by soldering in a wire braid insert.

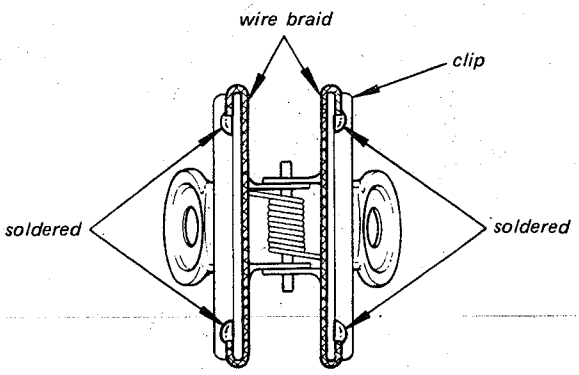


Fig. D Make sure that there is no solder on the inside.

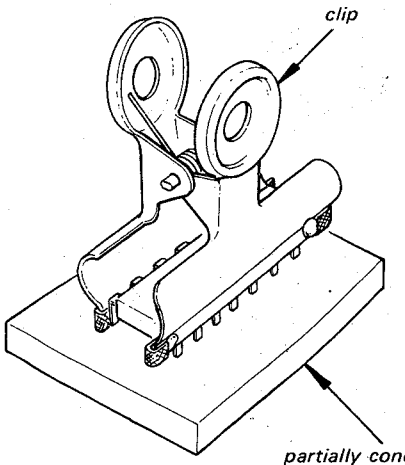


Fig. E

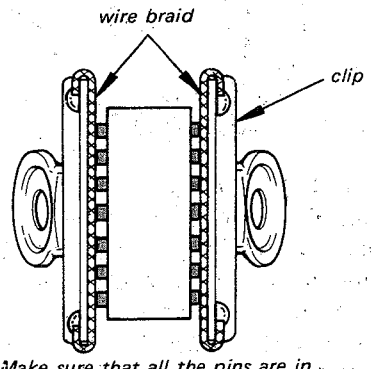


Fig. F Make sure that all the pins are in contact with the wire braid (all the pins will then be at the same potential.).

- Take a short length of fine bare wire and wind it around the IC so that it shorts all the pins of the IC, while it is still in the urethane-polyester cushion or aluminum foil. This ensures that all the pins are at the same potential.

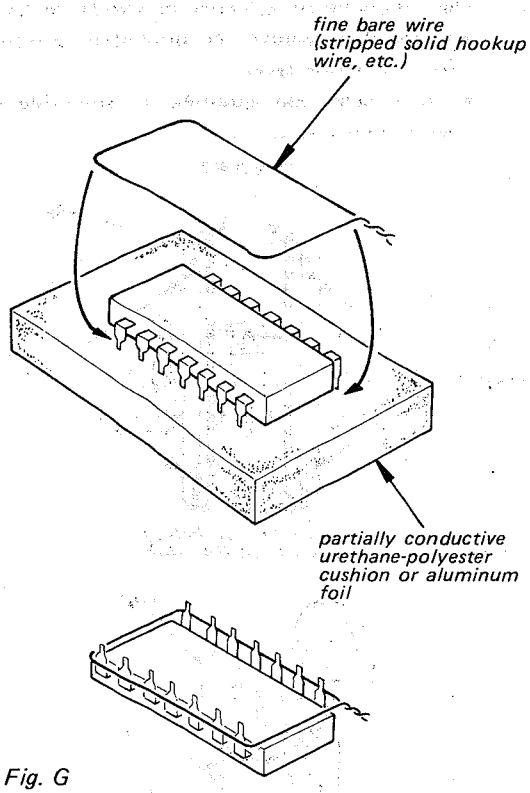


Fig. G

- When it is necessary to handle the IC with the fingers, do not touch any pin, and hold the IC at the ends of its plastic-package case as shown in Fig. H.

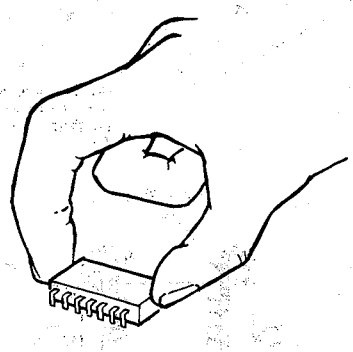


Fig. H

5. Method of Mounting
Insert the IC while holding it with the modified clip, and solder all the pins with the clip still shorting the pins. (Similarly, solder all the pins while the bare shorting wire is still wound around them.). Remove the clip or the bare shorting wire only after all the pins have been soldered.

Precaution while Checking C-MOS ICs

The C-MOS ICs (Complementary MOS) are MOS ICs that have their output sections made up of N-channel and P-channel push-pull stages to increase their speed of operation. If the output terminal of these ICs comes into contact with B+ or B- voltage, then the FET which is ON at that time will either become shorted or open.

This is valid for all the output sections that are connected together by the interconnections. Even the circuits that are physically separated (and not on the same board) can be destroyed simultaneously.

Example:

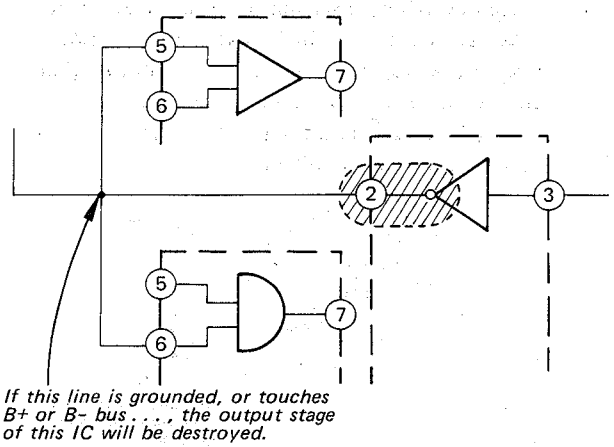


Fig. I

1-2. ON THE SONY® METALLIC TAPE CASSETTE

The SONY® metallic tape cassette is a remarkably improved tape when compared with the conventional ones. The SONY® metallic tape cassette uses a newly developed and fine-grained magnetic power which does not include oxyeon molecule.
The features of this tape cassette are:

a) superior linearity with a more-widened dynamic range
b) more-improved sensitivity and high-level recording made easy with more-than-sufficient signal-to-noise ratio
c) improved MOL (maximum output level) characteristics in the high-frequency region with an excellent frequency response

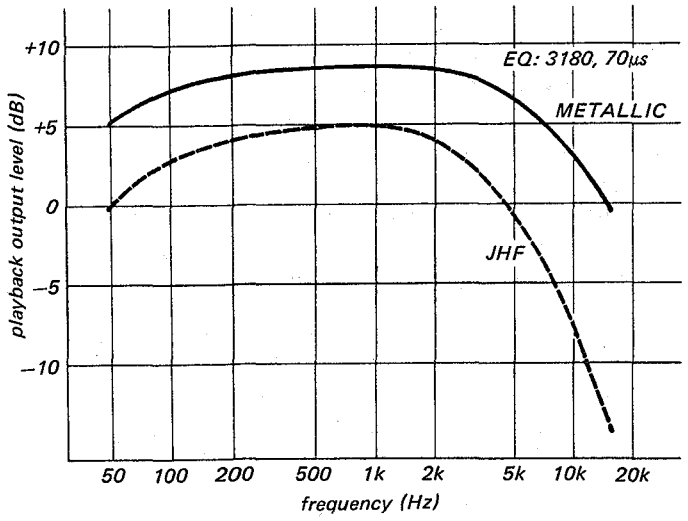


Fig. 1 MOL (maximum output level) Characteristics

To make the best use of this metallic tape cassette, this set is well equipped with metallic-tape oriented switch positions for the record bias and equalizer, and with an S & F (Sendust and Ferrite) head.

1-3. ON THE RECORD/PLAYBACK HEAD

This set uses a newly developed "S & F" (Sendust and Ferrite) record/playback head as shown in Fig. 2.

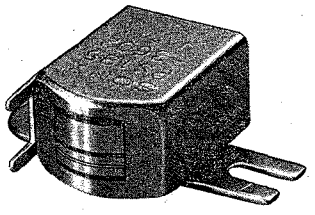


Fig. 2

This head succeeds to the following features of the conventional F & F head and the Sendust and Ferrite are combined to improve the performance of the time-proven F & F head.

a) not affected by temperature, humidity and long-time use (long life)
b) not one-side, but uniform wearing
c) very-sharp gap edge
d) good high-frequency performance
e) less dust gathering

The Sendust is an alloy of iron, aluminum and silicon. This alloy is a harder materials for head than the conventionally used permalloy, and the wearing amount due to the tape travel is very little as shown in Fig. 3.

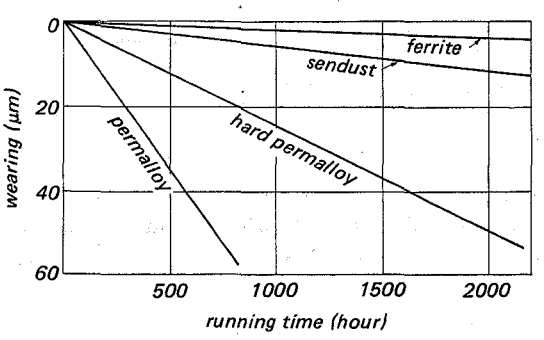


Fig. 3

The Sendust is a very convenient material for head because its saturated flux density and permeability are high. Table 1 shows the material characteristics of F & F and S & F heads.

Table 1

Head material	Permeability (at 0.3kHz)	Saturated flux density (in gauss)	Coercivity (in oersted)	Resistivity (in Ω-cm)
ferrite (F & F)	10,000	4,300	0.03	4
Sendust (S & F)	4,900	8,100	0.05	0.0001

As can be understood from the table, the Sendust's saturated flux density is very larger than the ferrite's. So, when the Sendust is used for the record/playback head, the linearity is very good due to its hard-to-saturate (magnetically) characteristics.

1-3-1. Structure of S & F Head

The gap section which is the most important part of the head is shown in Fig. 4. The hard quartz is strongly attached to the gap of the Sendust core by using a special evaporation method. Then the hard quartz and the Sendust core are brazed together by a melted special metal which is mechanically strong, and a sharp gap and gap edge are obtained.

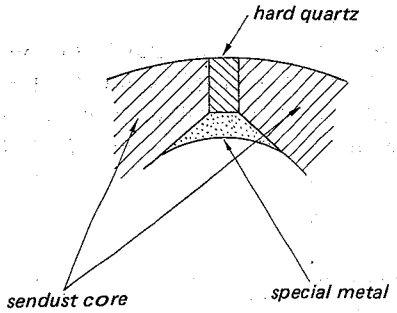


Fig. 4

The head surface on which the tape contacts is made of the Sendust in almost all areas and no one-side wearing of the head takes place even after a long-time usage.

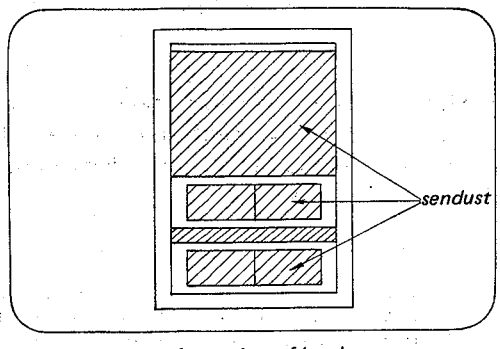


Fig. 5

The innards of the head comprises a three-hold construction of the (Sendust) – (ferrite) – (ferrite) configuration as shown in Fig. 6.

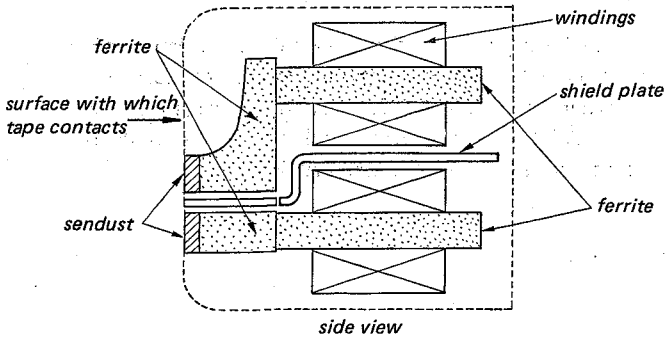


Fig. 6

1-3-2. Performance of S & F Head

a) Generally, the gap's length of a head is as short as possible to obtain a maximum gain in the higher-frequency region. This is clearly shown in Fig. 7 below.

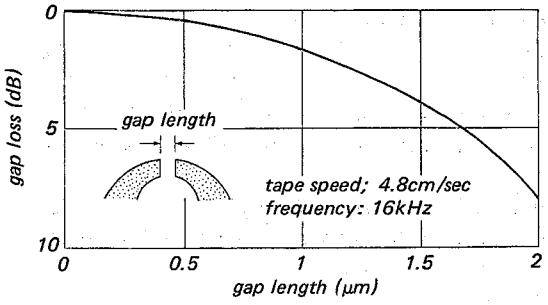


Fig. 7

On the contrary, the linearity and distortion factor degrade as the gap becoms, shorter. The S & F head uses the Sendust in the front section and a large cross-sectional area of ferrite in the rear section as shown in Fig. 6 above. Accordingly, the linearity and distortion factor retain a margin which makes the gap's length as short as possible. Thus the gap loss is reduced and the response in the high-frequency region is improved.

b) These metallic magnetic materials such as the Sendust and permalloy apt to degrade in the high-frequency response due to the flow of the eddy current. In many cases, these materials are processed to thin sheet metal and laminated to reduce the degradation in the high-frequency response. Fig. 8 shows the core loss vs. frequency curves of the four kinds of head, i.e., laminated Sendust, laminated permalloy, S & F and ferrite heads.

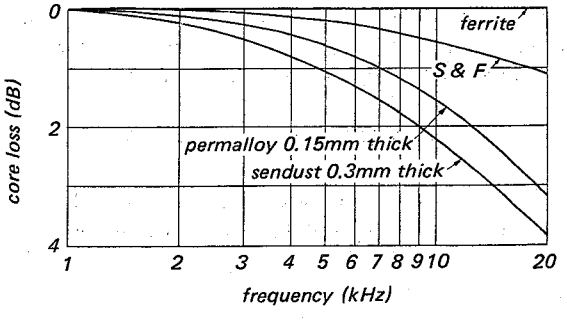


Fig. 8

As can be understood from Fig. 8, the laminated Sendust and laminated permalloy heads still have a large amount of core loss. The ferrite head has almost no loss on the contrary. The S & F head has a less core loss than the first two because most part of its magnetic circuit is made of ferrite and the frequency response is very good.

1-4. CIRCUIT DESCRIPTION

System Control Circuit

The sustem-control circuit of this tape recorder employs a single-chip microcomputer (μPD547-027). Receiving input signals from various controls or control switches of this recorder, the microcomputer delivers signals for driving the solenoid, reel motor, capstan motor, etc. in order to make the selection between operational modes.

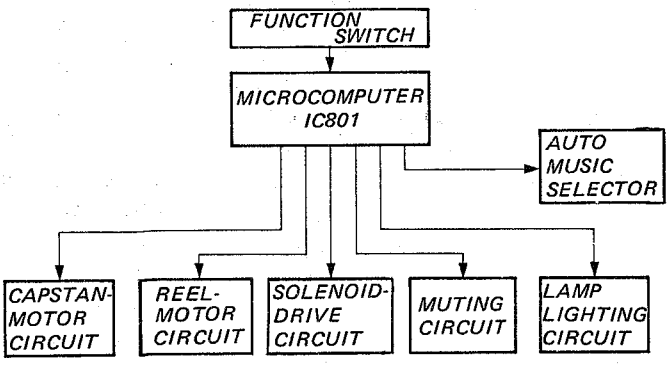


Fig. 9

1-4-1. Terminals of single-chip microcomputer and their functions

No.	Description
1	clock generating terminal
2	shut-off input terminal
3	timing-clock input terminal
4	N/A
5	N/A
6	N/A
7	reset input terminal
8	record input terminal
9	pause input terminal
10	record muting input terminal
11	N/A
12	output terminal for rewind lamp
13	output terminal for fast-forward lamp
14	output terminal for forward lamp
15	output terminal for record lamp
16	forward reel motor drive output terminal
17	DIN output terminal
18	bias-oscillator output terminal
19	output terminal for pause lamp
20	N/A
21	B+ terminal
22	output terminal for record relay
23	output terminal for record-muting control
24	output terminal for music sensor
25	muting-control output terminal
26	brake-solenoid (PM1) drive output terminal
27	head-solenoid (PM2) drive output terminal
28	output terminal for solenoid kick
29	input terminal for record muting
30	fast-forward reel-motor drive output terminal
31	rewind reel-motor drive output terminal
32	N/A
33	rewind input terminal
34	stop input terminal
35	forward input terminal
36	fast-forward input terminal
37	MEMORY-counter input terminal
38	TIMER playback input terminal
39	TIMER record input terminal
40	accidental-erasure prevention input terminal
41	ground terminal
42	clock generating terminal

1-4-2. When POWER switch is ON

1) Resetting IC801:

(1) C807 will start to be charged with the voltage through R817 from the power supply circuit.

(2) The inverter IC805 (1/3), R822 and R823 form together a Schmitt trigger circuit.

(3) Immediately after the POWER switch is turned on, a voltage of about 10 volts is applied from the Schmitt circuit to IC801 at terminal 7 (reset terminal) thereof, the latter being thus reset.

(4) When the potential charged in C807 exceeds the Schmitt level in about four seconds, the potential at terminal 7 will drop from 10 volts down to 0 volt, so that IC801 is released from the reset state. Then, it will be put into operation.

(5) Consequently, for a period of about four seconds after the POWER switch is turned on, no operation will occur even with any of the control switch buttons of the tape recorder depressed. It should be noted that D811 is a rapid-charging diode which is reverse-biased during the period from just turning-on of the POWER switch until immediately before turning-off thereof.

(6) When the POWER switch is OFF:

Voltage on the cathode side of D811 drops abruptly to zero volt. Accordingly, D811 will be forward-biased.

Potential in C807 is rapidly discharged by way of D811.

Thus, a voltage of about 10 volts is applied to terminal 7 of IC801 through the Schmitt circuit.

IC801 is now reset. By turning off the POWER switch, the tape recorder is released from all the modes of operation.

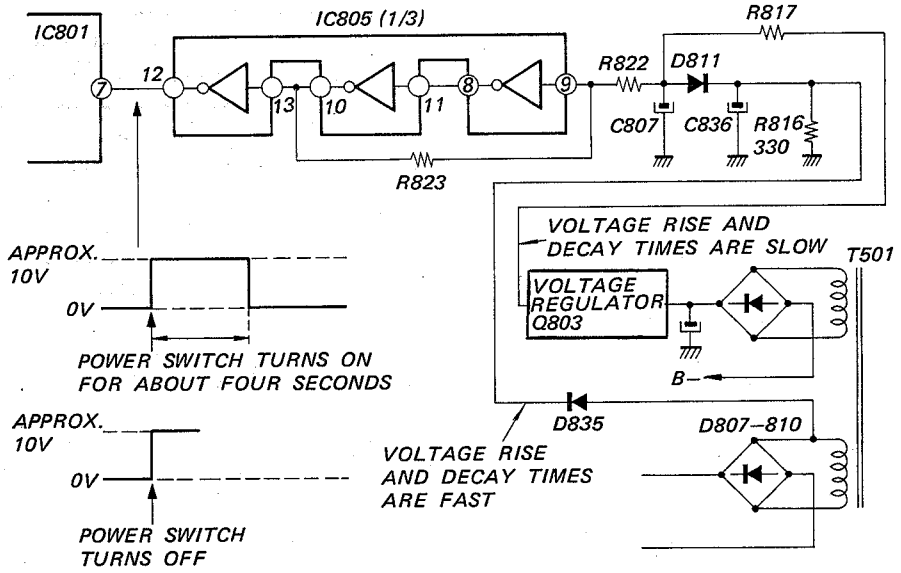


Fig. 10

2) Generating clock signal:

L801, C827 and IC801 work together to produce a clock signal of about 400kHz, which will prevail at the terminals 1 and 42 of IC801. If this signal is not available, the system-control circuit will not operate.

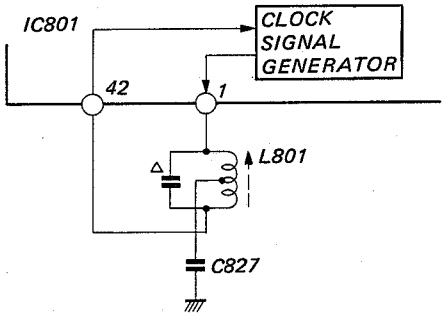


Fig. 11

3) Operation of TIMER switch:
In case the TIMER switch is placed at PLAY or REC, playback or record-mode operation will be started even with any corresponding button not depressed and immediately after IC801 is released from the reset state in four seconds from the turning-on of the POWER switch. After IC801 is released from the reset state, any change will not occur even by setting the TIMER switch to any position.

4) Suppressing noise immediately after the POWER switch is turned on (IC101 set to record mode):
(1) Before IC801 is released from the reset state (for four seconds immediately after the POWER switch is turned on), a voltage is applied through R821 and D812 from terminal 12 to terminal 1 of IC905.
(2) Then, terminal 2 of IC805 goes to "LOW" level.
(3) Q808 now turns on, delivering a voltage of about 8 volts at its collector.
(4) The voltage is then applied to terminal 12 of IC101 which in turn will be set for record mode.
(5) If IC101 is not set for playback mode in the timer operation, however, click noise occurs at times of mode changeover. To avoid this, the junction of R821 and D812 is grounded to turn the muting drive Q808 off so that the potential at terminal 12 of IC101 is rendered 0 volt, thereby setting IC101 in playback mode.

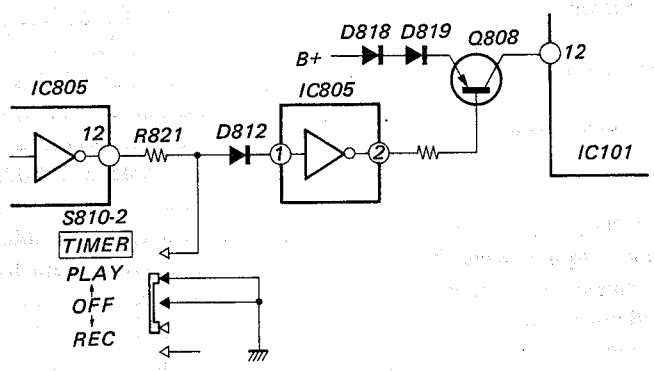


Fig. 12

5) Generating reference signal:
Q827 generates a reference signal of about 130Hz for each of the timing operations.
Such reference signal is generated as follows:
(1) C820 is charged through R941 and R942.
(2) When the charged potential exceeds a voltage determined by R938 and R939, it will rapidly be discharged.
(3) Then, C820 is re-charged.
(4) Repetition of such charging and discharging will result in a reference signal as shown in Fig. 13.
(5) If the frequency of the reference signal deviates considerably from the above value as 130Hz, no correct timing can be attained. In particular, when REC MUT button is pressed during the record mode, the pause lamp will flicker two times per second, which will be useful for checking the frequency deviation.
(6) Q825 is provided to temporarily stop the generation of reference signals in order to make a stopped state for about 0.3 second at time of direct function selection.

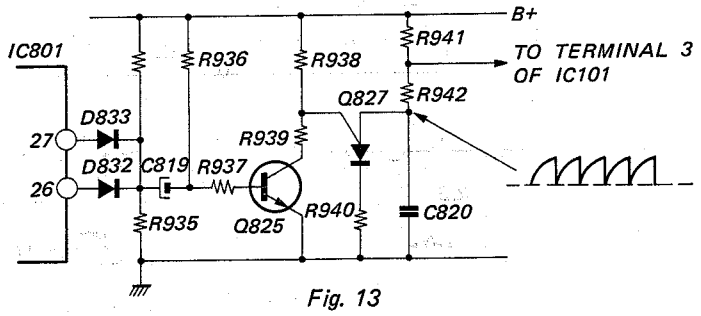


Fig. 13

1-4-3. Terminals of microcomputer IC801 and their functions

Refer to Fig. 15.

1) Input terminals for function switch:

The following terminals have priority one over another in the order from top to bottom.

(1) terminal 34:
input terminal for stop button
Input through this terminal has priority over all other inputs through the remaining terminals.

(2) terminal 36:
input terminal for rewind button

(3) terminal 33:
input terminal for fast-forward button

(4) terminal 35:
input terminal for forward button

(5) terminal 9:
input terminal for pause button

(6) terminal 8:
input terminal for record button

(7) terminal 10:
input terminal for REC MUTE button

2) Other input terminals:

(1) terminal 2:
Input terminal for shutting off. While the reel motor is turning, a square wave of +10 volts and 0 volt is applied to this input terminal. No shut-off will occur then.
When the reel motor stops turning, the potential of this terminal becomes in a stable 5V dc and the set shuts off. The set may not shuts off when a noise signal exists at this terminal.

(2) terminal 4:
The voltage is zero volt when the MEMORY/AMS switch (S812) is set to AMS. When the forward button and fast forward or rewind button are depressed at this time, AMS operation is started. Once this operation is started, it will last even if the MEMORY/AMS switch S812 is switched to MEMORY position.

(3) terminal 5:
The voltage is zero volt when the AMS display LED indicates "0". Otherwise, 10 volts will be delivered to this terminal.

(4) terminal 11:
The voltage is 10 volts when signals are fed to the playback amplifier; 0 volt when no signal is fed to the amplifier. Namely, this terminal is the input for detecting the interval in-between musics.
The interval detection amplifier is composed of a half of IC807. C811 is charged and discharged via Q818 and R870, and the resultant signal is then applied to terminal 2 of AMS IC IC802.
Now, an inverted and shaped output signal is obtained at terminal 3 of IC802. This output is inverted again by IC806 then applied to terminal 11 of IC801.

(5) terminal 37:
Input terminal for MEMORY counter, delivering a signal of differential waveform which becomes 0 volt for about 0.1 sec.

(6) terminal 40:
Input terminal for accidental-erasure prevention. When the level at this terminal is 0 volt (when a tape cassette with its claws torn away is loaded, S809 turns on to result in the zero volt), no record mode is established.

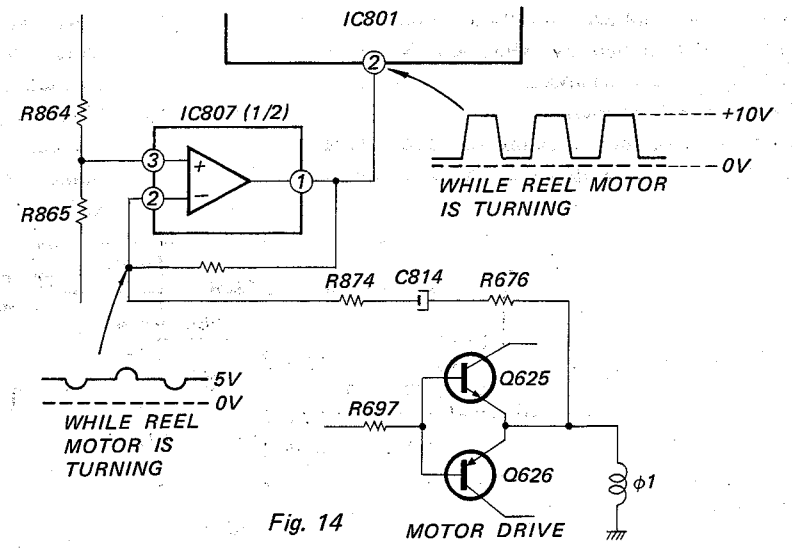


Fig. 14

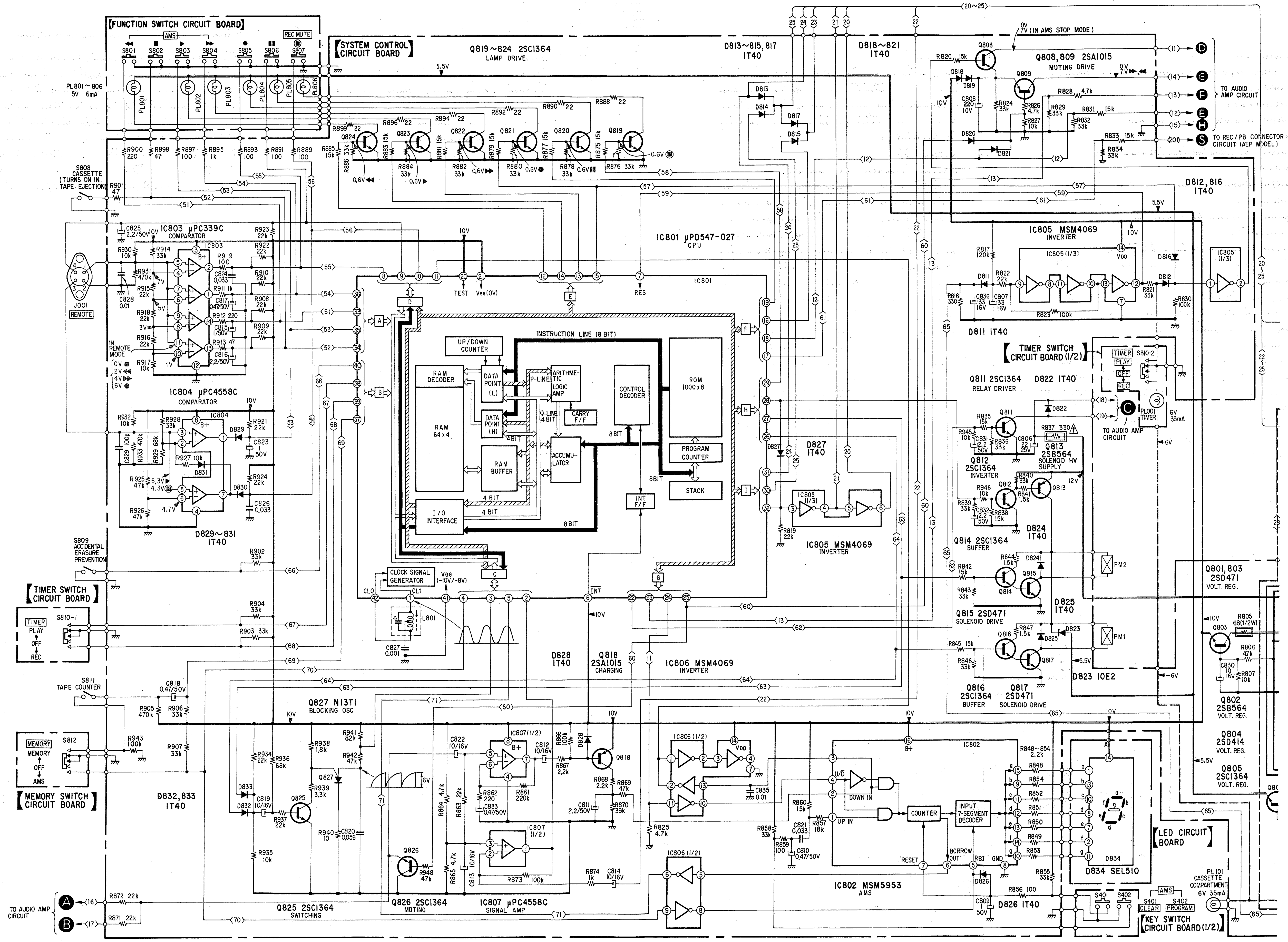

FUNCTION SWITCH CIRCUIT BOARD
SYSTEM CONTROL CIRCUIT BOARD
Q819~824 2SC1364 LAMP DRIVE
D813~815, 817 1T40
D818~821 1T40
Q808, 809 2SA1015 MUTING DRIVE
TO AUDIO AMP CIRCUIT
TO REC/PB CONNECTOR CIRCUIT (AEP MODEL)
S808 CASSETTE (TURNS ON IN TAPE EJECTION)
IC803 μPC339C COMPARATOR
IC801 μPD547-027 CPU
IC805 MSM4069 INVERTER
D812, 816 1T40
IC804 μPC4558C COMPARATOR
INSTRUCTION LINE (8 BIT)
UP/DOWN COUNTER
RAM DECODER
DATA POINT (L)
DATA POINT (H)
ARITHMETIC LOGIC AMP
CARRY F/F
CONTROL DECODER
ROM 1000 x 8
RAM 64 x 4
RAM BUFFER
ACCUMULATOR
PROGRAM COUNTER
STACK
INT F/F
I/O INTERFACE
CLOCK SIGNAL GENERATOR
D811 1T40
TIMER SWITCH CIRCUIT BOARD (1/2)
Q811 2SC1364 RELAY DRIVER
D822 1T40
Q813 2SB564 SOLENOID HV SUPPLY
Q812 2SC1364 INVERTER
D827 1T40
D824 1T40
Q814 2SC1364 BUFFER
Q815 2SD471 SOLENOID DRIVE
D825 1T40
Q801, 803 2SD471 VOLT. REG.
S809 ACCIDENTAL ERASURE PREVENTION
D829~831 1T40
TIMER SWITCH CIRCUIT BOARD
S811 TAPE COUNTER
D828 1T40
Q818 2SA1015 CHARGING
IC806 MSM4069 INVERTER
Q816 2SC1364 BUFFER
Q817 2SD471 SOLENOID DRIVE
D823 10E2
Q802 2SB564 VOLT. REG.
Q804 2SD414 VOLT. REG.
Q805 2SC1364 VOLT. REG.
Q827 N13T1 BLOCKING OSC
MEMORY SWITCH CIRCUIT BOARD
D832, 833 1T40
LED CIRCUIT BOARD
D834 SEL510
IC802 MSM5953 AMS
KEY SWITCH CIRCUIT BOARD (1/2)
Q825 2SC1364 SWITCHING
Q826 2SC1364 MUTING
IC807 μPC4558C SIGNAL AMP
D826 1T40
TO AUDIO AMP CIRCUIT

Fig. 15

3) Output terminals:
Being open-drain type, the terminals must be grounded by way of resistors.

(1) terminal 12:
output terminal for rewind lamp

(2) terminal 13:
output terminal for fast-forward lamp

(3) terminal 14:
output terminal for forward lamp

(4) terminal 15:
output terminal for record lamp

(5) terminal 29:
output terminal for REC MUTE lamp
The voltage of each of the above terminals becomes in 10 volts immediately after an input is fed to IC801 by operating a control button, in order to turn on the respective indication lamp.

(6) terminal 19:
Output terminal for pause lamp. The pause lamp flickers when the REC MUTE button is pressed. The flickering rate is 0.5 sec in the initial four seconds (the lamp flickers two times per second). By depresseing the REC MUTE button continuously for more than four seconds, the flickering rate becomes in 0.25 sec (a half of the above.).

(7) terminal 26:
Output terminal for brake solenoid (PM1). This terminal goes to "HIGH" level in fast-forward and rewind modes; Q816 and Q817 turn on, PM1 energizes to release the brake. Furthermore, the pinch roller will be separated from the capstan when the pause mode is effected.

(8) terminal 27:
Output terminal for head solenoid (PM2) Goes to "HIGH" level when forward, record or AMS mode is set; Q814 and Q815 turn on and PM2 energizes so as to raise the head block.

(9) terminal 28:
Output terminal for solenoid kick. This terminal will go to "HIGH" level simultaneoutly with the appearance of the outputs for each solenoid, and in 0.1 second, goes down to "LOW" level. Consequently, simultaneously with the appearance of the output for each solenoid, Q812 and Q813 turn on so that each solenoid will be energized with a high voltage. 0.1 second later, Q812 turns off.
In 0.1 second after the attraction, the solenoid will be energized with a low voltage in order to prevent being heated up.

(10) terminal 30:
Output terminal to drive the reel motor in fast-forward mode. By pressing the fast-forward button, a "HIGH" level output prevails on this terminal to drive the reel motor in fast forward.

(11) terminal 31:
Output terminal to drive the reel motor in rewind mode. When the rewind button is pressed, this terminal will deliver a "HIGH" level signal to drive the reel motor in rewind mode.

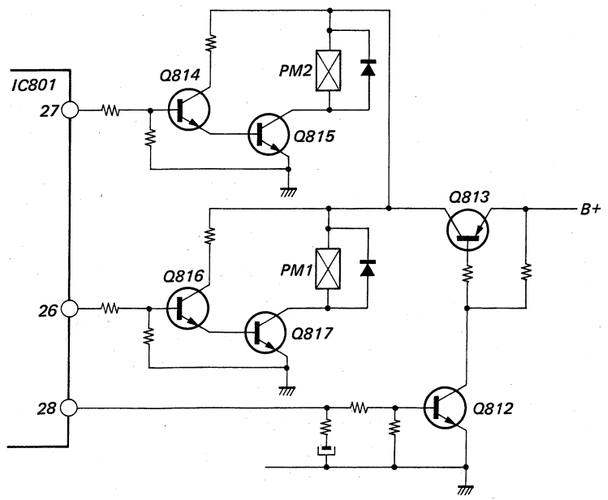


Fig. 16

(12) terminal 16:
Output terminal to drive the reel motor in forward mode. By pressing the forward button, there will prevail a "HIGH" level signal at this terminal to drive the reel motor in forward mode.

1-4-4. On the Reel-Motor Control Circuit

The operational amplifier IC604 delivers at its output a zero, or positive or a negative voltage with respect to the ground depending upon the input signal received. The BSL motor is featured in that it can be turned in forward or reverse direction by supplying positive or negative input signal. Therefore, by using the operational amplifier as a driver of the motor, the reel motor (BSL) can be turned in forward or reverse in accordance with the output voltage from the operational amplfier.

1. Depressing fast-forward button (See Fig. 17)

1) Terminal 30 of IC801 goes to "HIGH" (about 10 volts) level.
2) Signal ① turns Q618 on and Q619 off.
3) Signal ② turns Q621 and Q622 on.
4) Thus, Q624 and Q623 turn on so that the gain of the reel-motor drive amplifiers (IC605, Q625 and Q626) and (IC605, Q627 and Q628) rises to increase the torque of the reel motor in the fast-forward mode.
5) Because the potential at the base of Q615 is 0 volt, this transistor will turn off, with the result that Q616 turns off, then Q617 turns off.
6) The potential on the collector of Q617 goes positive, and this positive voltage is applied to terminal 3 (positive terminal) of IC604. Thus, the output of the operational amplifier IC604 becomes positive, so that the reel motor will rotate forward.
7) The reel motor's torque is increased and turned forward. Thus, the fast-forward operation is established.

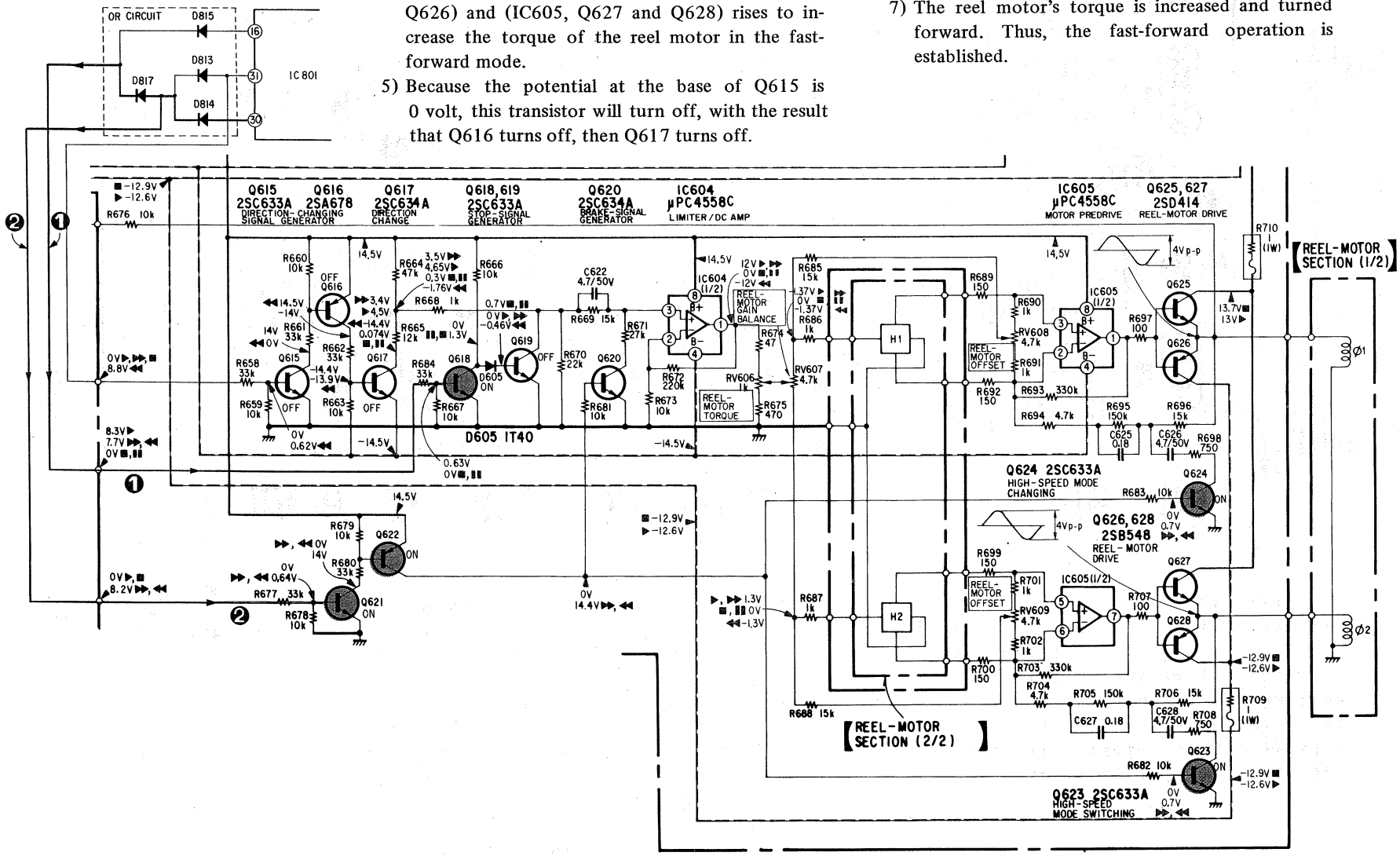


Fig. 17

2. Depressing rewind button (See Fig. 18)

1) Terminal 31 of IC801 goes to "HIGH" level.
2) Signal ① turns Q618 and Q619 off.
3) Signal ② turns Q621 on and Q622 off.
4) Thus, Q624 and Q623 turn on, and the gain of the motor-drive amplifiers (IC605, Q625 and Q626) and (IC605, Q627 and Q628) rises to increase the torque of the reel motor in rewind mode.
5) Signal ③ turns Q615 on, which in turn will turn Q616 and Q617 on.
6) The potential on the collector of Q617 goes negative, and a negative voltage is applied to terminal 3 (positive terminal) of IC604. Thus, the output of the operational amplifier IC604 becomes negative, so that the reel motor will be turned reversely.
7) The reel-motor torque is increased and the motor turns reversely. Thus, the rewind operation is established.

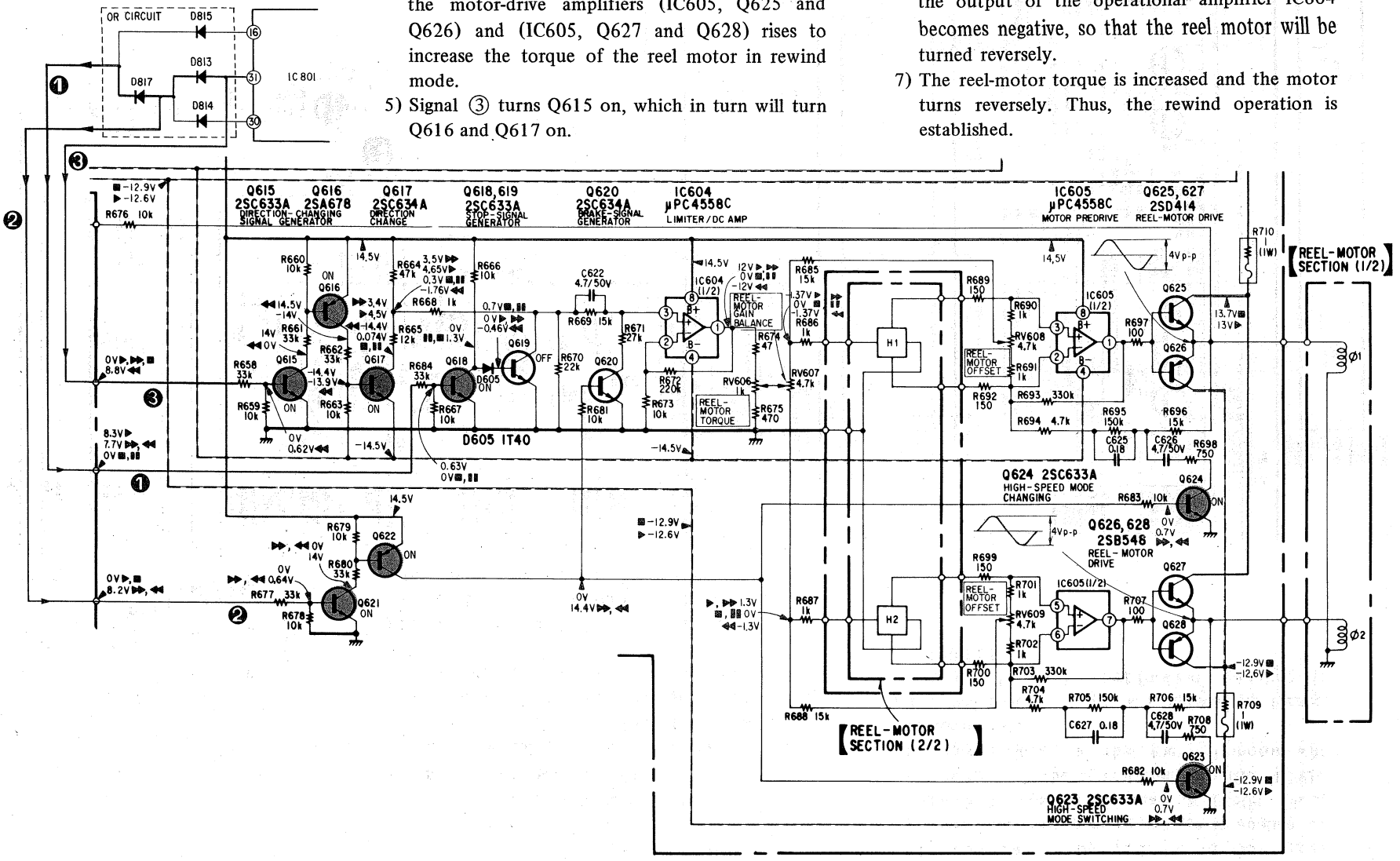


Fig. 18

3. Depressing forward button (See Fig. 19)

1) Terminal 16 of IC801 goes to "HIGH" level.
2) Signal ① turns Q621 and Q622 off.
3) Because the potential at the base of Q621 is 0 volt, Q621 turns off, then Q622 turns off.
4) Thus, Q624 and Q623 turn off, so the torque of the reel motor will not be increased.
5) Since the potential at the base of Q615 is 0 volt, this transistor turns off, which in turn will cause Q616 and Q617 to be turned off.
6) Thus, the potential at the collector of Q617 becomes positive, and a positive voltage is applied to terminal 3 (positive terminal) of IC604. Output from the operational amplifier IC604 becomes positive, thus the reel motor will turn forward.
7) In this way, the set becomes in the playback mode.

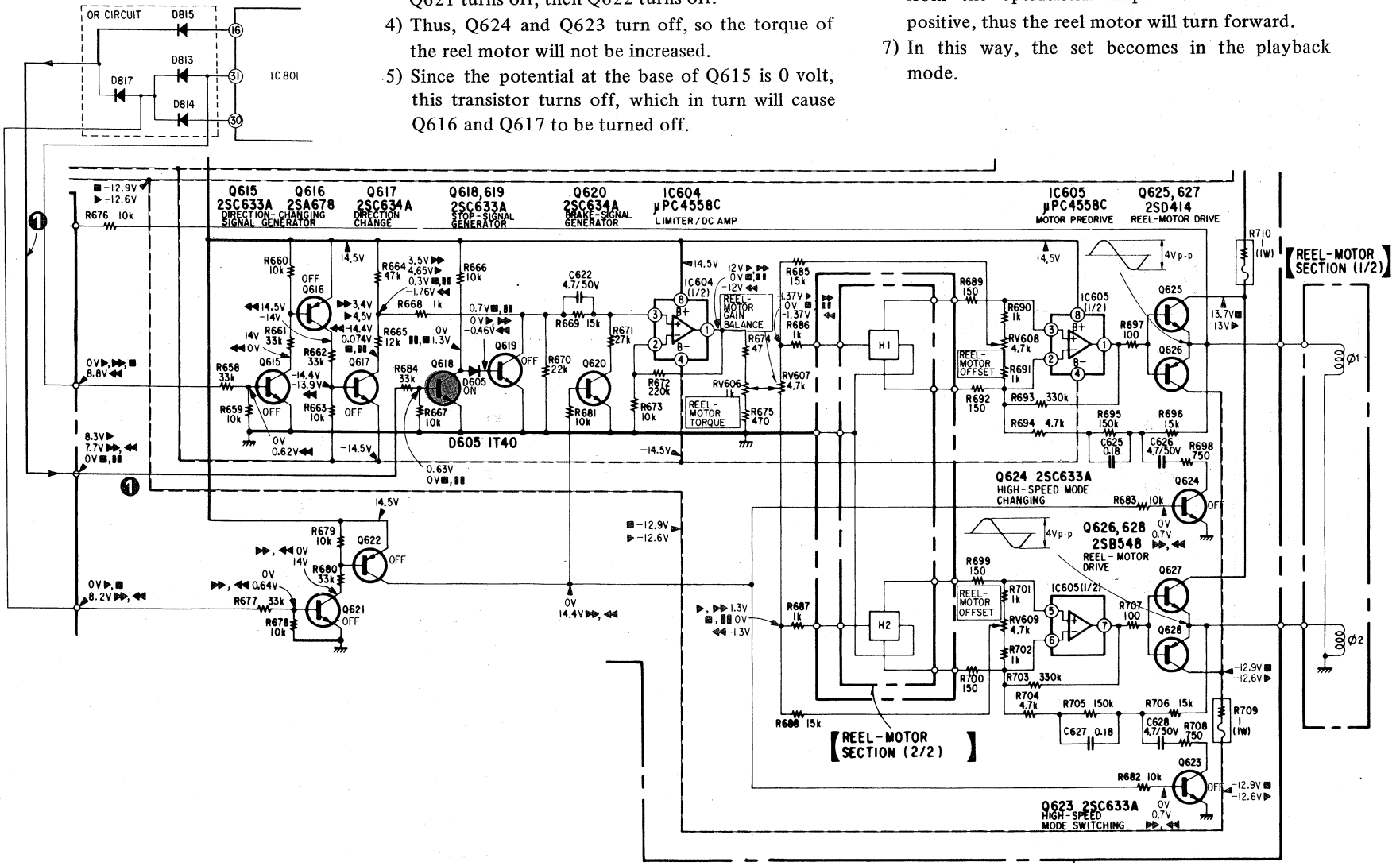


Fig. 19

4. Depressing stop button (See Fig. 20)

1) All the terminals 16, 31 and 30 of IC801 go to "LOW (0 volt)" level.
2) Because the potential at the base of Q618 is 0 volt, this transistor will be turned off while Q619 is turned on.
3) As the result, the potential at terminal 3 (positive terminal) of IC604 becomes 0 volt, and the output from it will also be 0 volt. Thus, the reel motor stops turning.

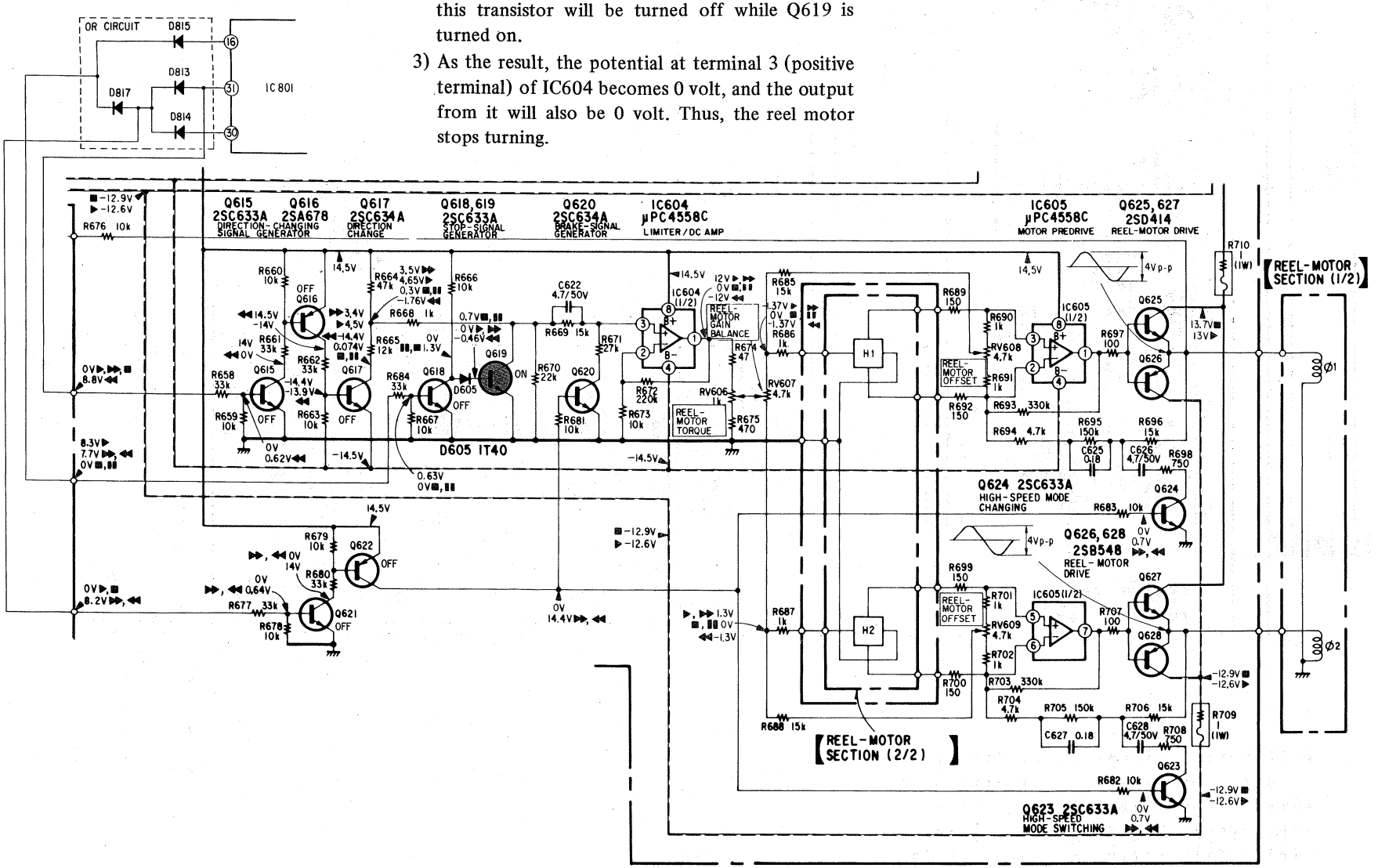


Fig. 20

5. Electromagnetic brake for reel motor during fast-forward and rewind modes (See Fig. 21)

1) Q620 turns on in fast-forward and rewind modes.
2) While the reel motor is turning, namely while Q619 is off, C622 is charged via R668 with a positive or negative voltage depending upon the turning direction of the reel motor.
3) The charged potential will be discharged through Q619 when the reel motor is stopped (at this time, Q619 turns on).
4) Therefore, the positive terminal of the operational amplifier IC604 is applied with a voltage of a sign opposite to that during the turning of the reel motor, so that the output from the operational amplifier IC604 will be a voltage of a sign opposite to that during the turning of the reel motor.
5) The reel motor will turn reverse, which serves as a brake to rapidly stop the turning of the reel motor during fast-forward and rewind modes.
6) This brake will be released when C622 is completely discharged.

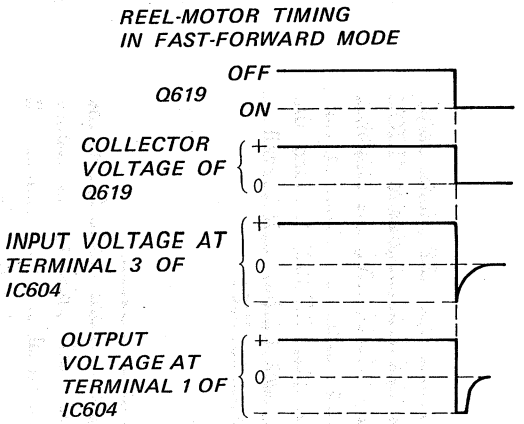


Fig. 22

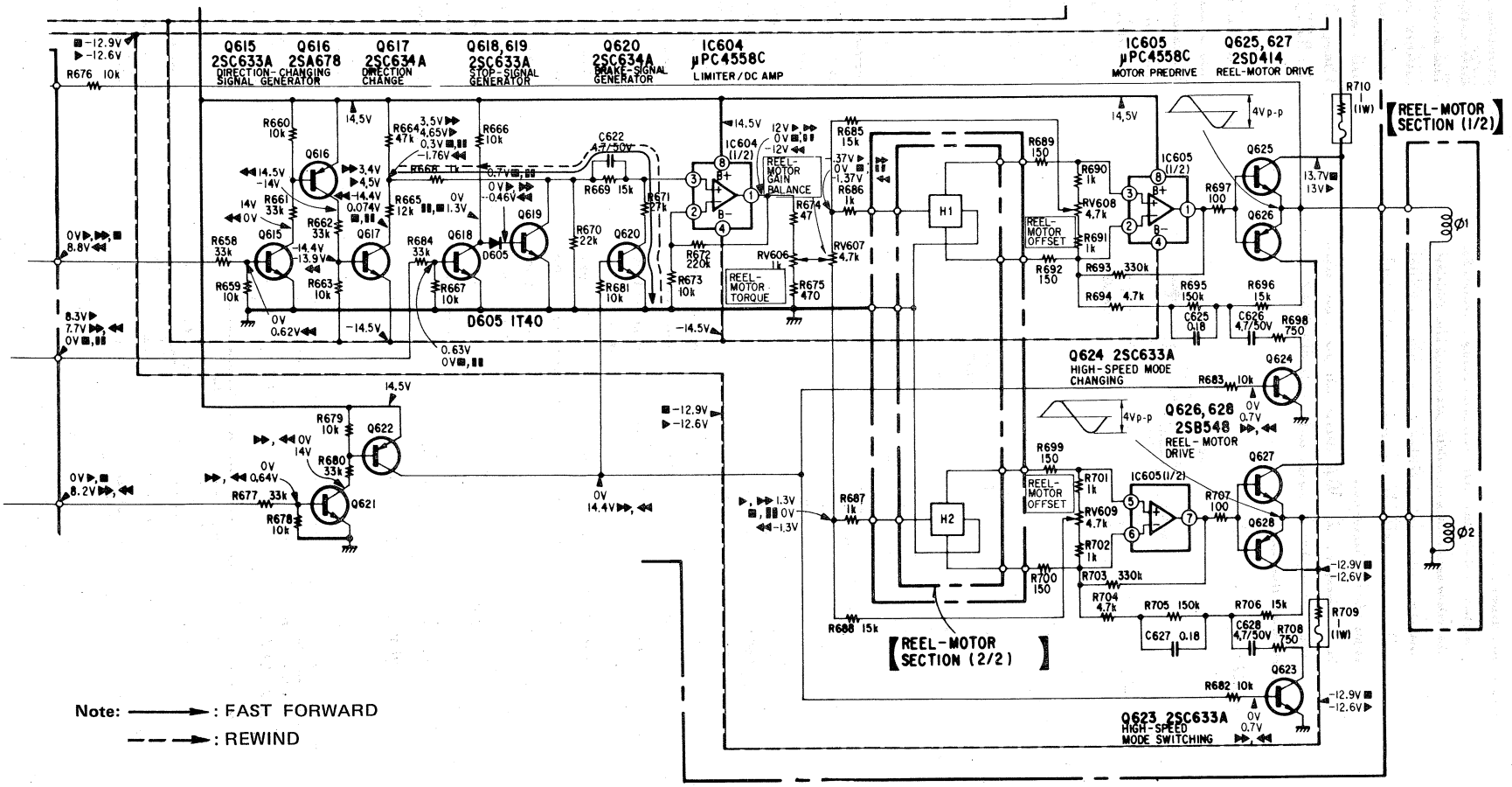


Fig. 21

(13) terminal 22:
Output terminal for record relay. Depress the forward button while pressing the record button, and the potential at this terminal will go to "HIGH (about 10 volts)" level, thus Q811 turns on.
Accordingly, RY301 turns on so that the head terminal is switched from playback to record mode.

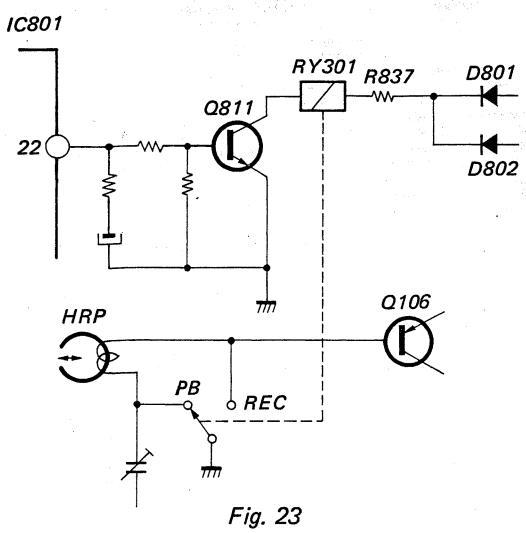


Fig. 23

(14) terminal 23:
Output terminal for record muting control. By establishing record mode (depress the forward button while pressing the record button), the potential at this terminal will be "HIGH (about 10 volts)" level. Then, Q111, which has been on, is turned off, so that the record muting is released. By operating other than the record button, the potential at this terminal goes to "LOW" level. B- voltage is applied to the base of Q111 through R326, thus Q111 is turned on. In this way, the output amp in IC101 is muted.

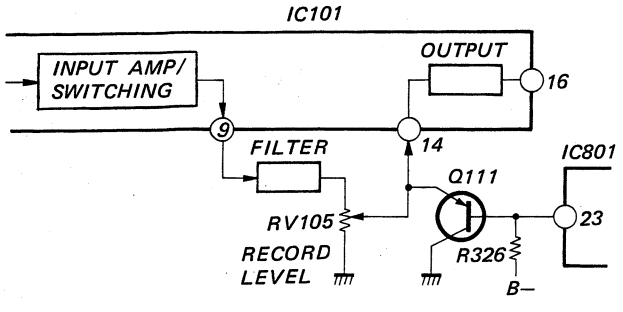


Fig. 24

(15) terminal 17:
DIN output terminal (for AEP Model only). The potential at this terminal goes to "HIGH (about 10 volts)" level during the playback mode and Q314 turns on, which in turn will cause the relay RY302 to turn on. Then, the playback output will prevail at the REC/PB connector J301.

(16) terminal 18:
bias-oscillator output terminal.
By establishing the record mode (press the forward button while pressing the record button), the potential at this terminal will go to "HIGH (about 10 volts)" level. Now Q313 through Q311 turn on, so that B+ is applied to the bias oscillator circuit which will be put into operation.

(17) terminal 25:
output terminal for muting control:
When the forward or record button is pressed, the potential at this terminal goes to "HIGH (about 10 volts)", while it will be "LOW (0 volt)" level when other buttons (stop, fast-forward and rewind) are pressed.
Accordingly, in stop, fast-forward or rewind mode, Q809 has the emitter potential higher than the base potential, so that it turns on, thus a voltage of about 7 volts will prevail at its collector.
As the result, Q109 turns on and the output from the playback amplifier will be muted.
Q112 turns on and LINE OUT signal will be muted.
Q826 turns off because the potential of its base becomes in 0 volt so that the signal from AMS circuit will not be muted.
Then, during the playback or record mode, Q809 has the emitter potential lower than the base potential, thus this transistor will be turned off. The collector potential of Q809 will be 0 volt.
As the result, Q109 turns off and the muting of the playback amplifier will be released. Q112 turns off and the LINE OUT muting will also be released.
Further, Q826 turns on because its base potential is higher than that of the emitter, and the AMS circuit will be muted.

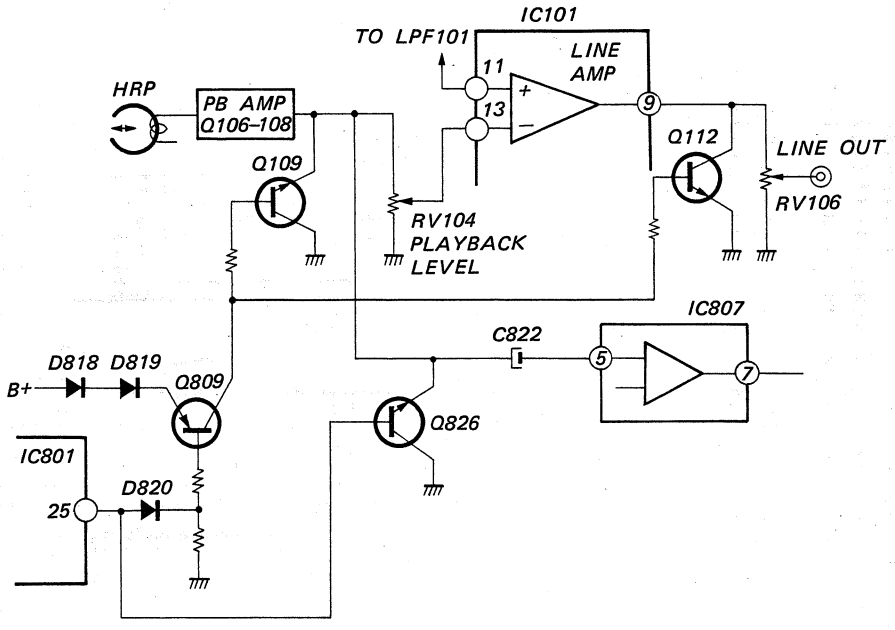


Fig. 25

1-4-5. Automatic Music Sensor Circuit

This is a circuit which, by sensing the interval from one music to another recorded on a magnetic tape, counts the number of such musics. It can cope with a maximum of nine musics, and permits to start the playback of the musics beginning with a preset one.

1. Terminals of IC801 (LED driver/up-down counter) and their functions

(1) terminal 16:
bias (B+) terminal (10 volts)

(2) terminal 8:
grounding terminal

(3) terminals 9 to 15:
numerical output terminals of LED display

(4) terminal 1 "UP IN":
Count-down input terminal. When the level at this terminal is "low" (0 volt), the counter counts up by one. The counter is built in IC801. At this time, the terminals 9 to 15 are grounded, respectively.

(5) terminal 2 "DOWN IN":
Count-down input terminal. When the level at this terminal is "high" (10 volts), count-down preparation is effected in IC801. Thereafter, when the level becomes "low" (0 volt), the counter counts down by one. However, no further count-down operation will be effected to less than "zero".

(6) terminal 3 "DOWN OUT":
Count-down output terminal. When the level at terminal 2 mentioned above is "low", namely, when no signal prevails there, this output terminal will continue delivering signals of 10 volts.

(7) terminal 4 "UP-DOWN":
Where the level at this terminal is "low", the terminals 2 "DOWN IN" and terminal 6 "BORROW OUT" are effective. However, when the level is "high", both terminals 2 and 6 are not operative.

(8) terminal 5 "PBI":
AMS input terminal. Receives an input signal for turning on LED when trying AMS (automatic music selection). When the level at this terminal is "high", LED will be turned on unconditionaly.

(9) terminal 6 "BORROW OUT":
When displaying "zero", this output terminal continues delivering signals of 10 volts.

(10) terminal 7 "RESET":
When the level at this terminal is "low", delivers signals to reset the LED for display of "0" (zero). (Whenever the POWER switch is turned OFF, the level at this reset terminal becomes "low". Therefore, subsequent turning on of the POWER switch will cause the LED to display "0" (zero).

2. When MEMORY/AMS switch (S812) is placed at MEMORY (See Fig. 26)

(1) The level at terminal 4 of IC801 becomes "high". This level is inverted through IC806. There will prevail "low" level at terminal 8 of this IC806.

(2) Since the level at terminal 5 of IC802 becomes "low", LED will not be turned on.

(3) Also, the level at terminal 7 of IC802 is "low", so the LED will be reset once to display "0" (zero).

(4) Press the rewind button to rewind the tape. When the tape-counter switch (S811) is turned on (the tape-counter reads "999", the negative side of C818 will be grounded and the potential at terminal 37 of IC801 will be of differential waveform of 0 volt for about 0.1 sec.

(5) The level at terminals 26 and 31 of IC801 will be "low", then the tape rewinding will be stopped.

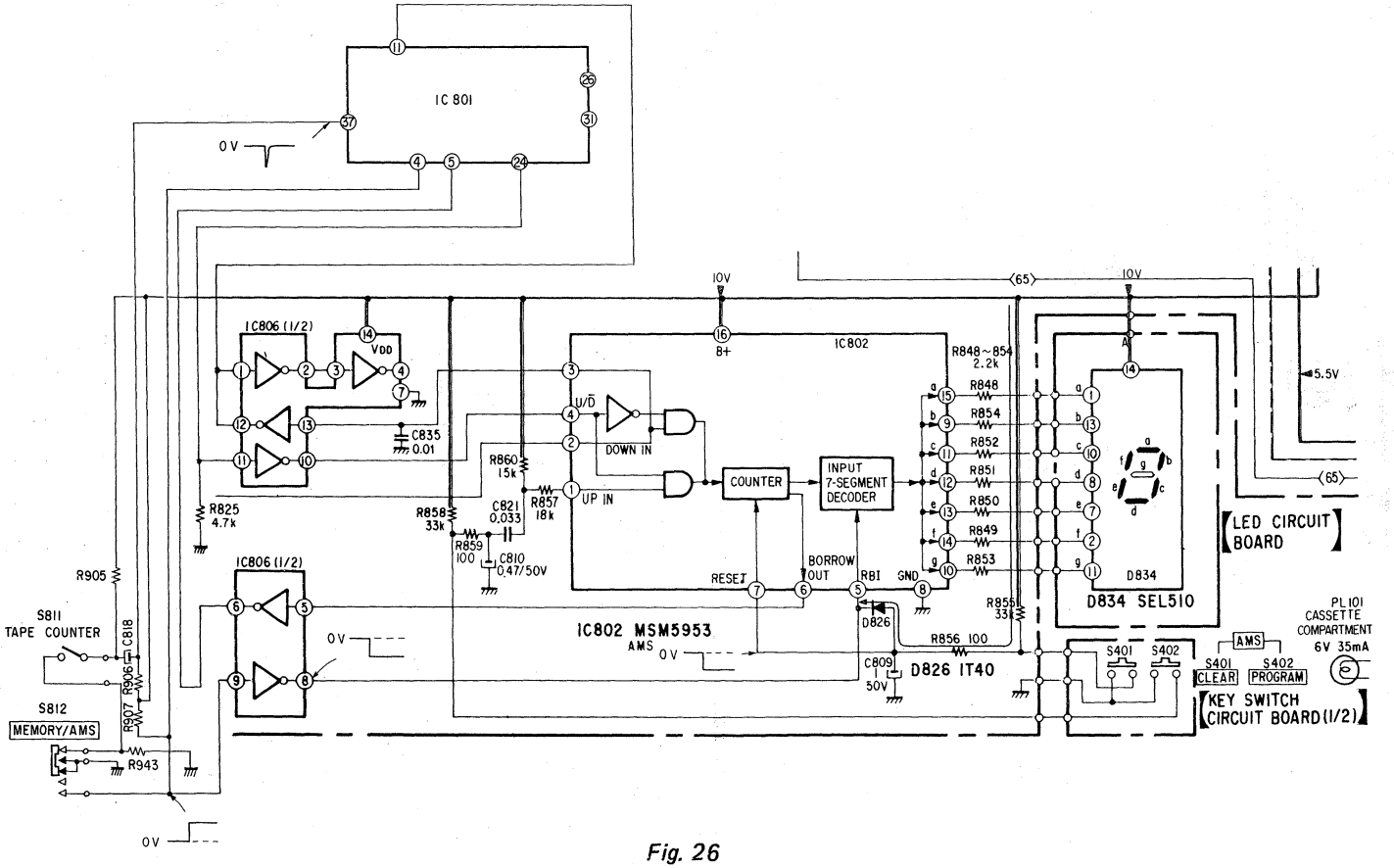


Fig. 26

3. When MEMORY/AMS switch (S812) is set to OFF position (See Fig. 27)

(1) Since the level at terminals 5 and 7 of IC802 is "low" as in Item 2 above, LED will not be turned on. Further, the LED will be reset to display "0" once.

(2) Even when the rewind button is depressed and the tape-counter switch (S811) is turned on, the negative side of C818 is not grounded so that the potential at terminal 37 of IC801 will not be of differential waveform. Consequently, the tape rewinding will not be stopped but will last.

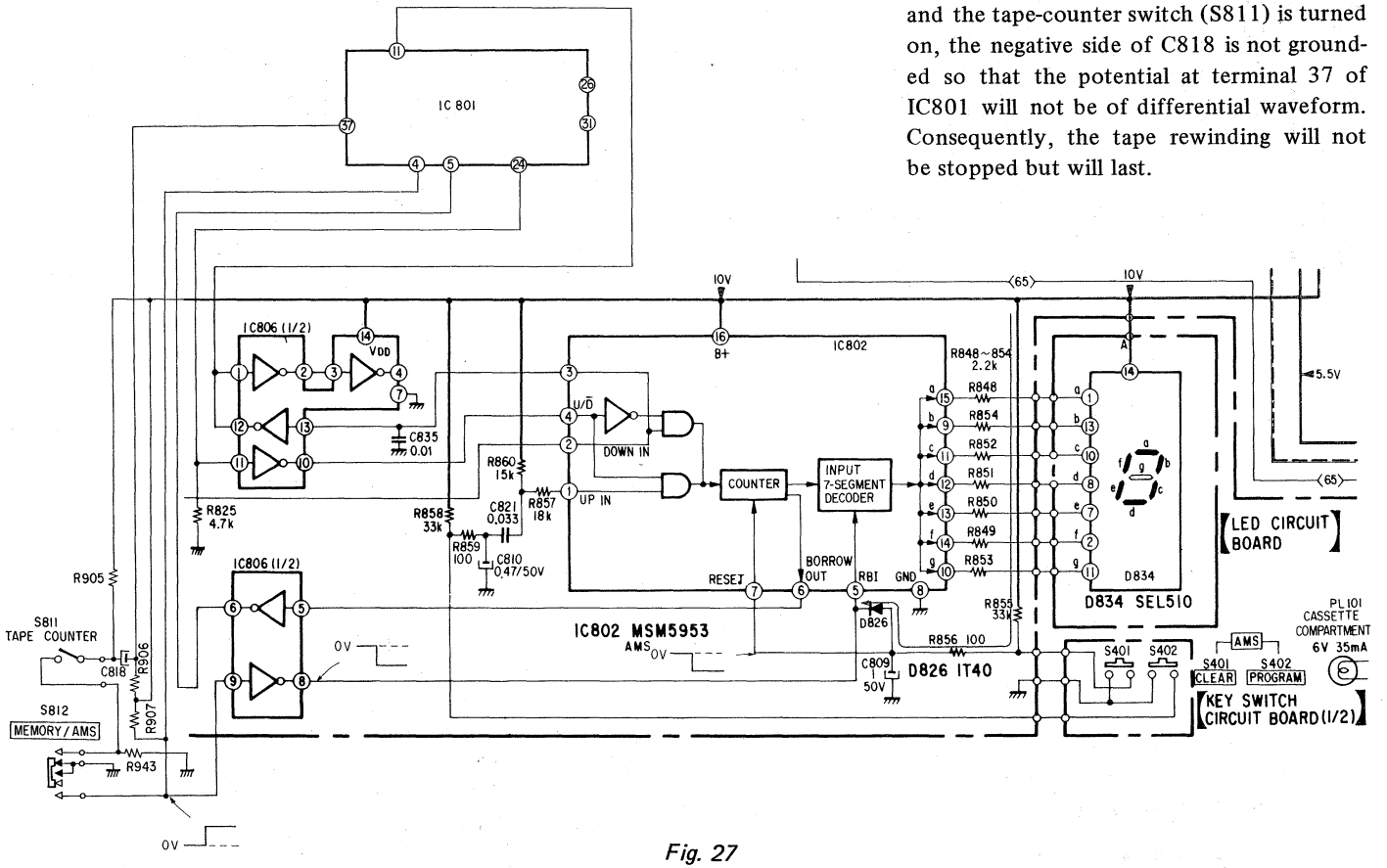


Fig. 27

4. When MEMORY/AMS switch (S812) is set to AMS (See Fig. 28)

(1) With this switch setting, terminal 4 of IC801 is grounded and so the level at this terminal becomes "low". This level will be inverted through IC806. The level at terminals 5 and 7 of IC802 will be "high" so that LED will turn on. Thus, the resetting to the display of "0" is cleared.

(2) The level at terminals 24 of IC801 gets "low", which will be inverted through IC806. Since the level at terminal 4 of IC802 becomes "high", terminals 2 "DOWN IN" and 6 "BORROW OUT" will not be operative.

5. Count-up operation (See Fig. 28)

With the PROGRAM switch (S402) depressed, the differential circuit of C810 and C812 will deliver negative pulses to terminal 1 of IC802, thus the counter acts to count up.

6. Clearing operation (See Fig. 28)

By pressing the CLEAR switch (S401), the level at terminal 7 of IC802 becomes "low", resetting the LED to display "0" (zero).

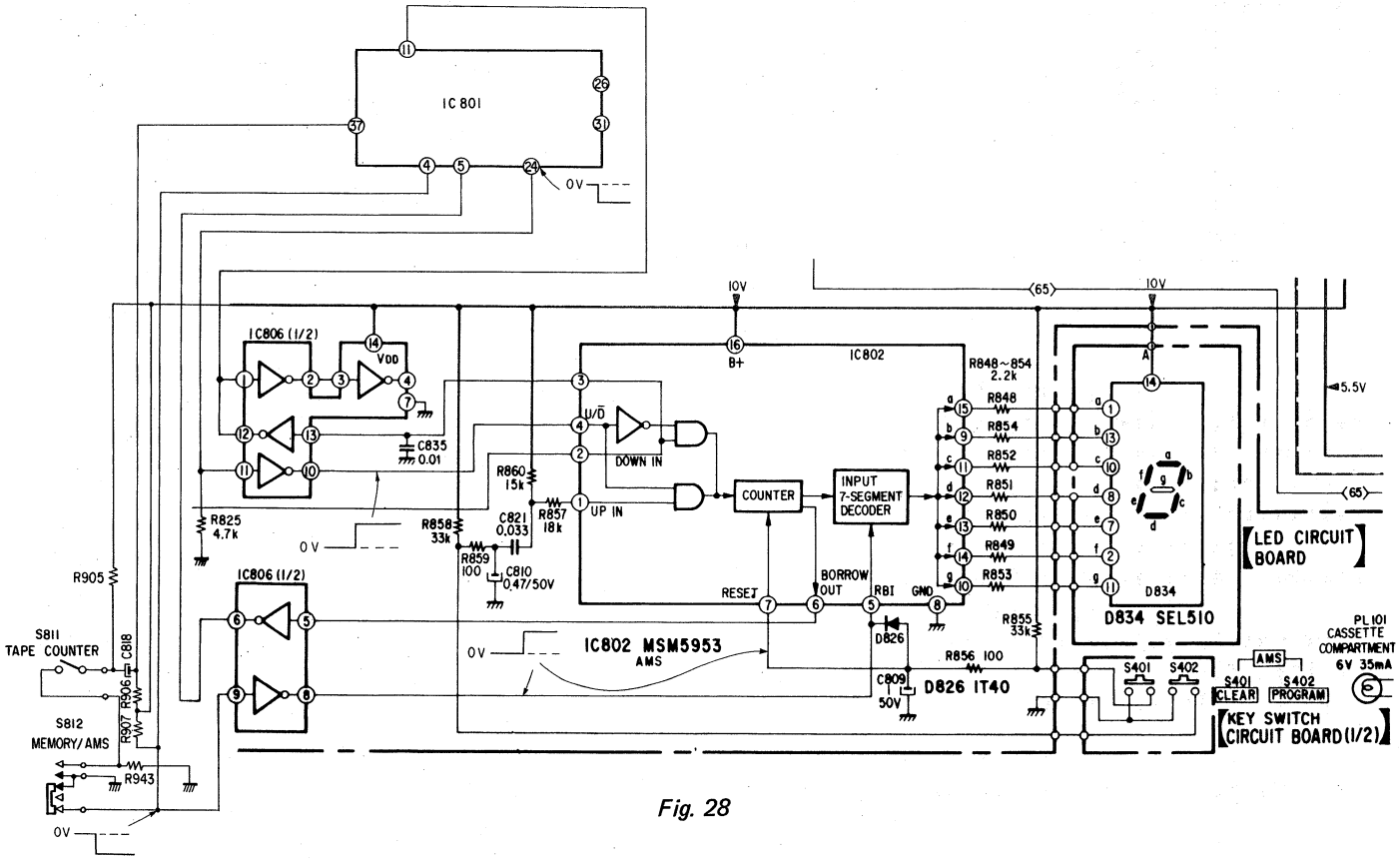


Fig. 28

7. Principle of detecting AMS (automatic music sensor) signal (See Fig. 29)

(1) Set the MEMORY/AMS switch (S812) to AMS position.

(2) Depress simultaneously the forward and fast-forward buttons, or forward and rewind buttons.

(3) The level at terminal 24 of IC801 gets "high", which will be inverted through IC806. Then the level at terminal 4 of IC802 becomes "low", and terminals 2 and 6 of IC802 will be effective.

(4) The level at terminal 25 of IC801 will be "low" and Q826 will turn off. Thus, the muting is released, and the detection of AMS signal is made possible.

(5) The playback signal is amplified through IC807 and applied to the base of Q818 at the collector from which a voltage will appear.

(6) The level at terminal 2 of IC802 becomes "high" so that the counter gets ready for count-down operation in IC802.

(7) During an interval between two successive musics (where no signal is delivered), C811 is discharged through R870 to make the level at terminal 2 of IC802 "low". Thus, count-down is effected. The discharge characteristic of C811 determines whether or not that interval should be taken as inter-music interval.

(8) Next, when the count-down is made from "1" to "0", the level at both terminals 3 and 6 of IC802 gets "high".

(9) The output from terminal 3 of IC802 is shaped, inverted to "low" level through IC806, and applied to terminal 11 of IC801.

(10) The output from terminal 6 of IC802 is inverted by IC806 to "low" level and is applied to terminal 5 of IC801.

(11) Only the fast-forward or rewind mode is cleared, and playback is started.

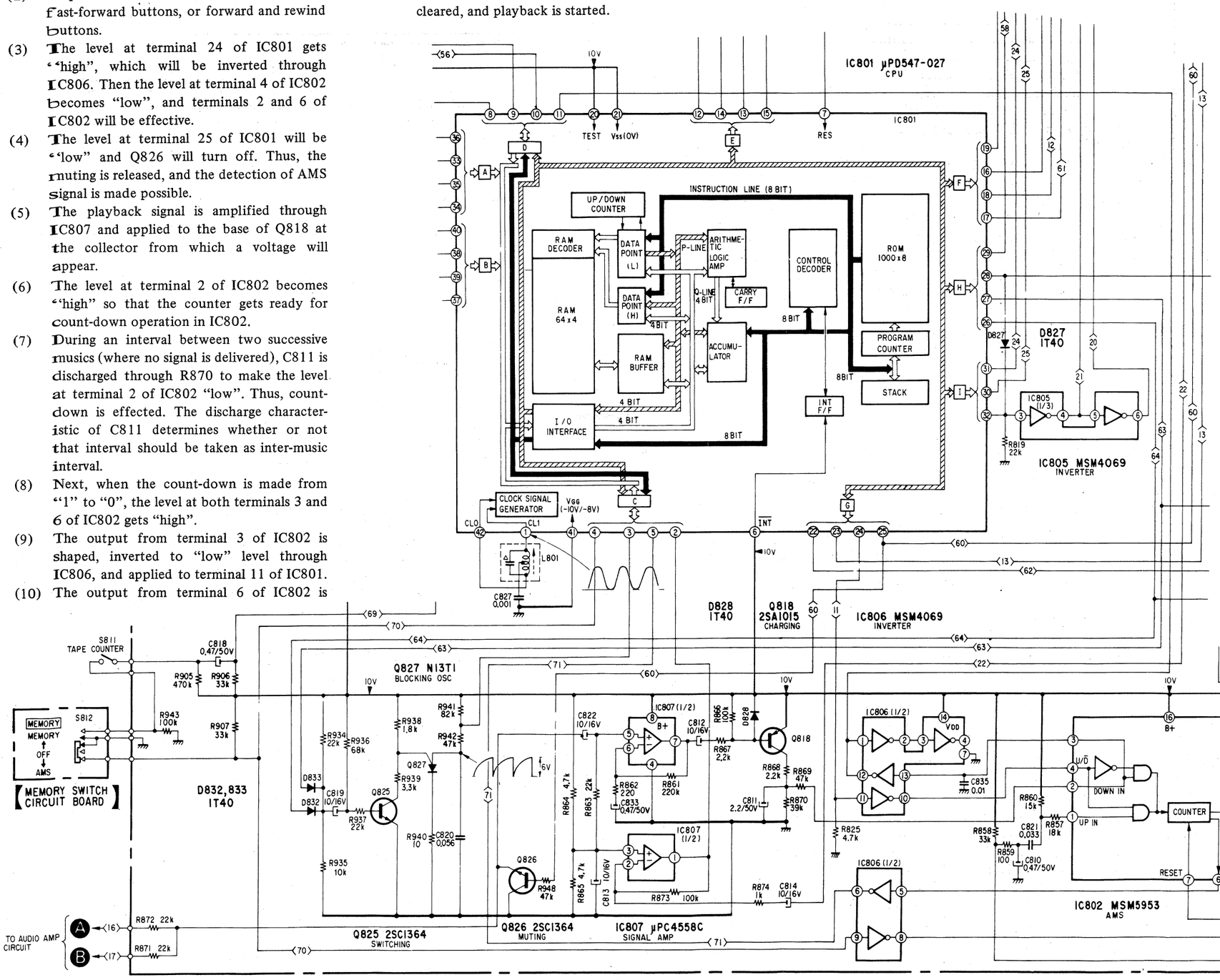


Fig. 29

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inputs have priority one over another, (stop, rewind, fast-forward, forward, pause, record, REC MUTE in this order), stopping will result.

(4) C815, C816, C817 and C824 have been selected in value of capacitance so that the function buttons of higher priority be returned more slowly when they are released. Further, R911, R912 and R913 have been so selected in value of resistance that function buttons of higher priority be set more preferentially fast when they are depressed.

(5) IC804 is a dual operational amplifier, but may be considered as comparator circuits of satisfactory linearity.

(6) Since the output of IC803 is open-collector, this IC will not be damaged when any function button connected in parallel to this circuit is pressed. However, since the output of IC804 is complementary, the circuit may possibly be damaged if any function button connected to the circuit is depressed. To avoid such damage, D829 and D830 are provided for protecting IC804.

(7) IC804 is an integrated circuit having two comparator circuits built therein. The positive terminals are connected together for a same voltage thereon. The negative terminals are so set that the comparator circuits will deliver 6.7 volts at terminal 2 thereof, and 4.7 volts at terminal 6.

(8) The potential at the positive terminals of IC804 is normally 10 volts. Under this assumption:

- o With the " ▶ " (forward) button of the remote control unit depressed, the potential at the positive terminals becomes 5.3 volts. Consequently, the comparator circuit 5 will deliver 0 volt at its output (terminal 1), and 10 volts at the output (terminal 7). Since terminal 1 is connected to the forward input terminal of IC801, the set becomes in playback mode.
- o Depress the " ■ " (REC MUTE) button of the remote control unit, and the potential at the positive terminals of IC804 will be 4.3 volts. Therefore, the comparator circuit 6 will deliver 0 volt at its output (terminal 7). Thus, the comparator 5 will receive 3.1 volts at terminal 2 thereof so that the output will be 10 volts at terminal 1. In this way, playback mode is cleared.
- o When both the forward and REC MUTE buttons are pressed at a time, the potential at the positive terminal becomes 3 volts. The comparator circuits will deliver 0 volt at their respective outputs.

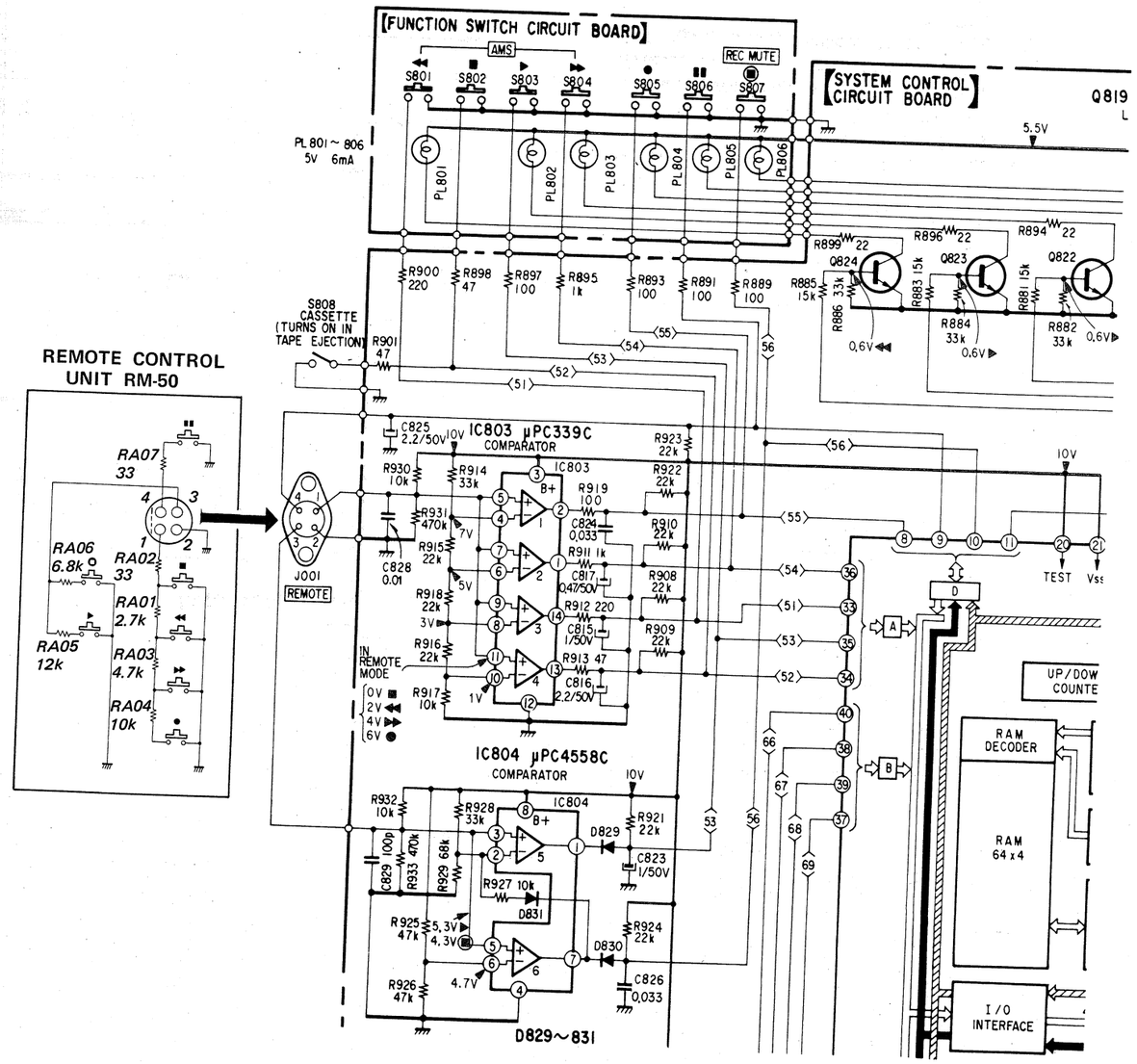


Fig. 30

7. Principle of detecting AMS (automatic music sensor) signal (See Fig. 29)

(1) Set the MEMORY/AMS switch (S812) to AMS position.

(2) Depress simultaneously the forward and fast-forward buttons, or forward and rewind buttons.

(3) The level at terminal 24 of IC801 gets "high", which will be inverted through IC806. Then the level at terminal 4 of IC802 becomes "low", and terminals 2 and 6 of IC802 will be effective.

(4) The level at terminal 25 of IC801 will be "low" and Q826 will turn off. Thus, the muting is released, and the detection of AMS signal is made possible.

(5) The playback signal is amplified through IC807 and applied to the base of Q818 at the collector from which a voltage will appear.

(6) The level at terminal 2 of IC802 becomes "high" so that the counter gets ready for count-down operation in IC802.

(7) During an interval between two successive musics (where no signal is delivered), C811 is discharged through R870 to make the level at terminal 2 of IC802 "low". Thus, count-down is effected. The discharge characteristic of C811 determines whether or not that interval should be taken as inter-music interval.

(8) Next, when the count-down is made from "1" to "0", the level at both terminals 3 and 6 of IC802 gets "high".

(9) The output from terminal 3 of IC802 is shaped, inverted to "low" level through IC806, and applied to terminal 11 of IC801.

(10) The output from terminal 6 of IC802 is inverted by IC806 to "low" level and is applied to terminal 5 of IC801.

(11) Only the fast-forward or rewind mode is cleared, and playback is started.

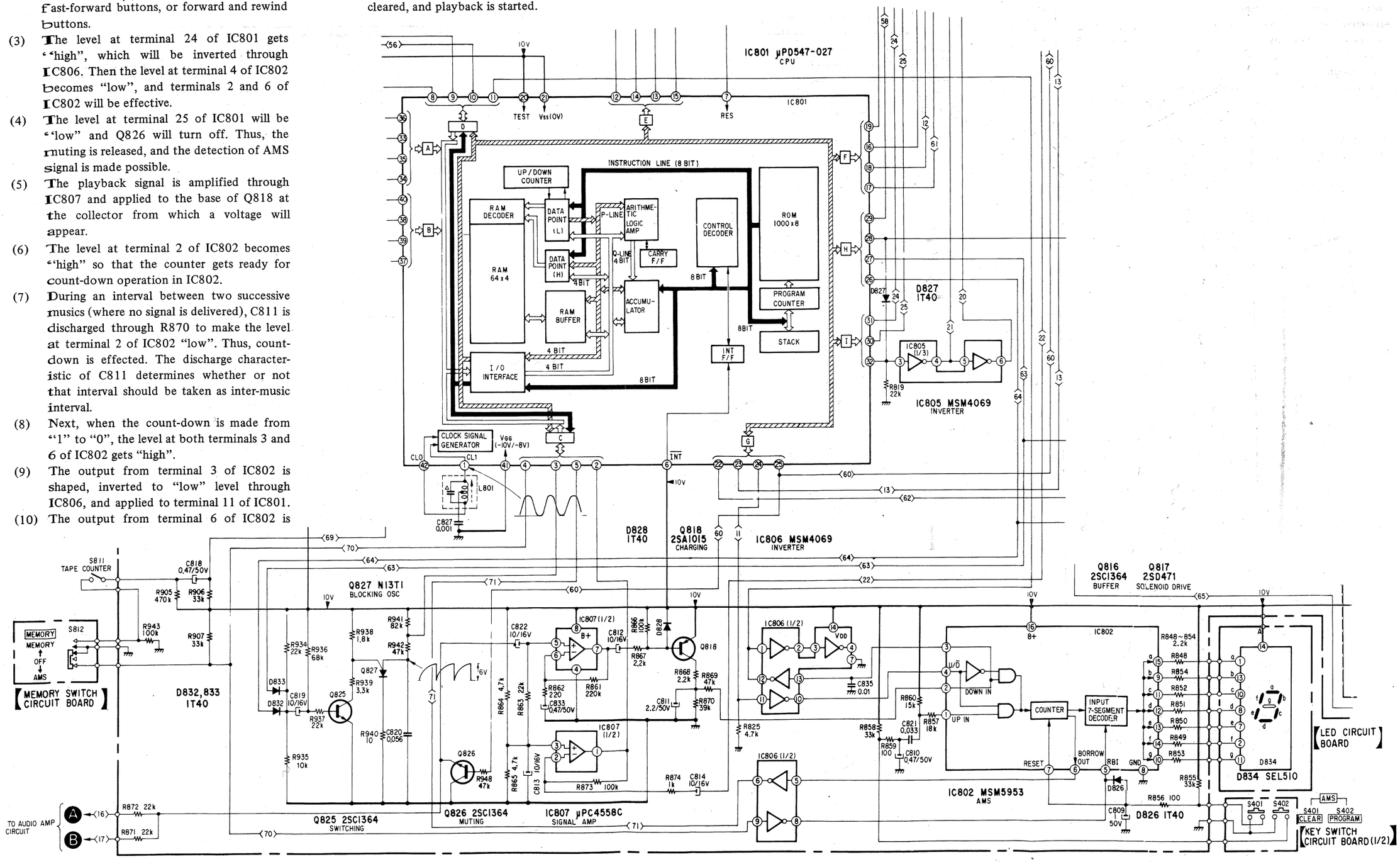


Fig. 29

1-4-6. Four-Wire Remote Control Circuit (See Fig. 30)

This remote control circuit is developed to provide a small, lightweight remote control unit with reduced number of wires. Conventional remote controls were equipped with 10 wires, while this new remote control circuit has only four wires and keeps the same function as that of such conventional controls. This circuit consists of J001, IC803 and IC804. A circuit description will be given below:

(1) IC803 is an integrated circuit comprising four-comparator circuits. Each of these comparator circuits has a positive and negative inputs and an output in set. When the potential at the positive input is higher than that at the negative input, there will prevail a potential of 10 volts at the output. On the contrary, if the level at the positive input is lower than that at the negative input, the potential at the output will be zero volt. It should be noted that the output of IC803 is an open collector.

(2) The positive terminals are connected to one another so that the potentials at all of them are identical. The negative terminals are so set that the potentials at the terminals of comparator circuits are as follows: 7 volts at terminal 4; 5 volts at terminal 6; 3 volts at terminal 8; and 1 volt at terminal 1.

(3) The potential at the positive terminals is normally 10 volts. Under this assumption:
- o Press the button "●" (record) of the remote control unit, and the potential at the positive terminals will be 6 volts. Therefore, the first comparator circuit 1 delivers 0 volt at its output (terminal 2); the second comparator circuit 2 delivers 10 volts at the output (terminal 1) thereof; the third comparator circuit delivers 10 volts at its output (terminal 14); and the fourth comparator circuit delivers 10 volts at its output (terminal 13). Since terminal 2 is connected to the record input terminal of IC801, the set becomes in record mode.
- o With the button " ▶▶ " (fast-forward) of the remote control unit depressed, the potential at the positive terminals will be 4 volts; depress the button " ◀◀ " (rewind), and the potential at the positive terminals will be 2 volts; and with the button "■" (stop) depressed, the potential at the positive terminals will be 0 volt. Thus, the comparator circuits will operate sequentially. Upon depressing the "■" (stop) button, there will be delivered 0 volt at all the output of the comparator circuits. Since the inputs have priority one over another, (stop, rewind, fast-forward, forward, pause, record, REC MUTE in this order), stopping will result.

(4) C815, C816, C817 and C824 have been selected in value of capacitance so that the function buttons of higher priority be returned more slowly when they are released. Further, R911, R912 and R913 have been so selected in value of resistance that function buttons of higher priority be set more preferentially fast when they are depressed.

(5) IC804 is a dual operational amplifier, but may be considered as comparator circuits of satisfactory linearity.

(6) Since the output of IC803 is open-collector, this IC will not be damaged when any function button connected in parallel to this circuit is pressed. However, since the output of IC804 is complementary, the circuit may possibly be damaged if any function button connected to the circuit is depressed. To avoid such damage, D829 and D830 are provided for protecting IC804.

(7) IC804 is an integrated circuit having two comparator circuits built therein. The positive terminals are connected together for a same voltage thereon. The negative terminals are so set that the comparator circuits will deliver 6.7 volts at terminal 2 thereof, and 4.7 volts at terminal 6.

(8) The potential at the positive terminals of IC804 is normally 10 volts. Under this assumption:
- o With the " ▶ " (forward) button of the remote control unit depressed, the potential at the positive terminals becomes 5.3 volts. Consequently, the comparator circuit 5 will deliver 0 volt at its output (terminal 1), and 10 volts at the output (terminal 7). Since terminal 1 is connected to the forward input terminal of IC801, the set becomes in playback mode.
- o Depress the " ■ " (REC MUTE) button of the remote control unit, and the potential at the positive terminals of IC804 will be 4.3 volts. Therefore, the comparator circuit 6 will deliver 0 volt at its output (terminal 7). Thus, the comparator 5 will receive 3.1 volts at terminal 2 thereof so that the output will be 10 volts at terminal 1. In this way, playback mode is cleared.
- o When both the forward and REC MUTE buttons are pressed at a time, the potential at the positive terminal becomes 3 volts. The comparator circuits will deliver 0 volt at their respective outputs.

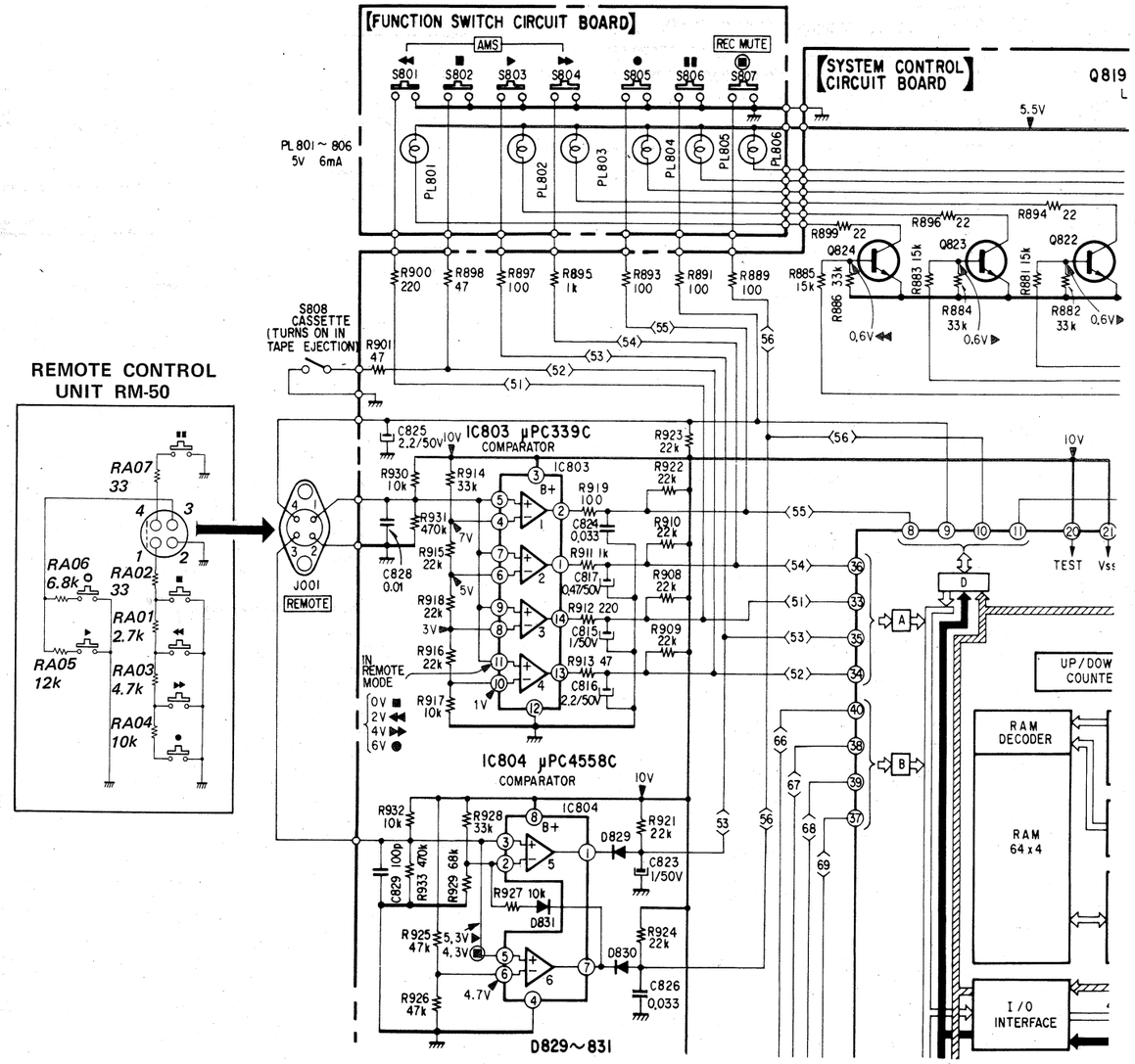
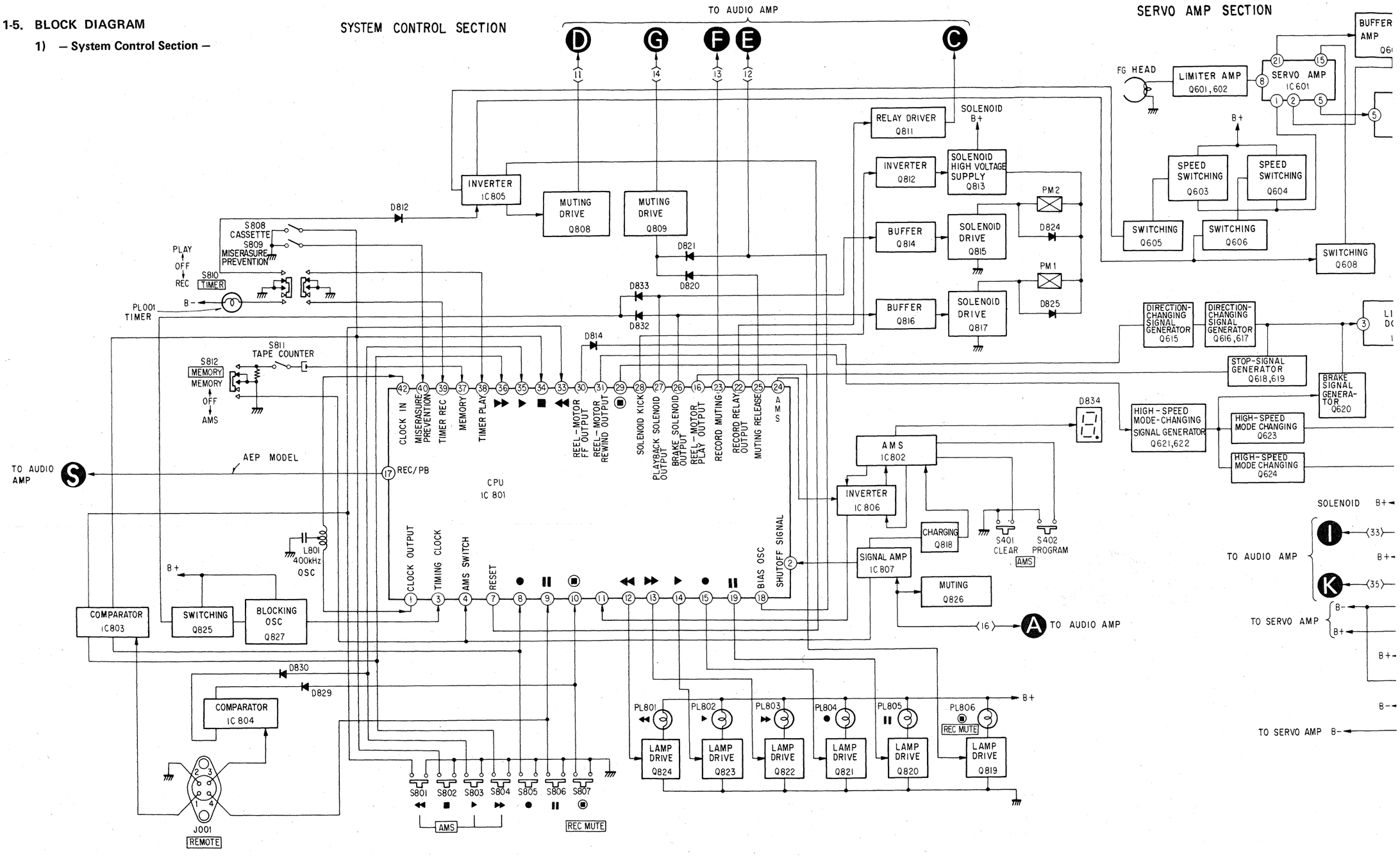
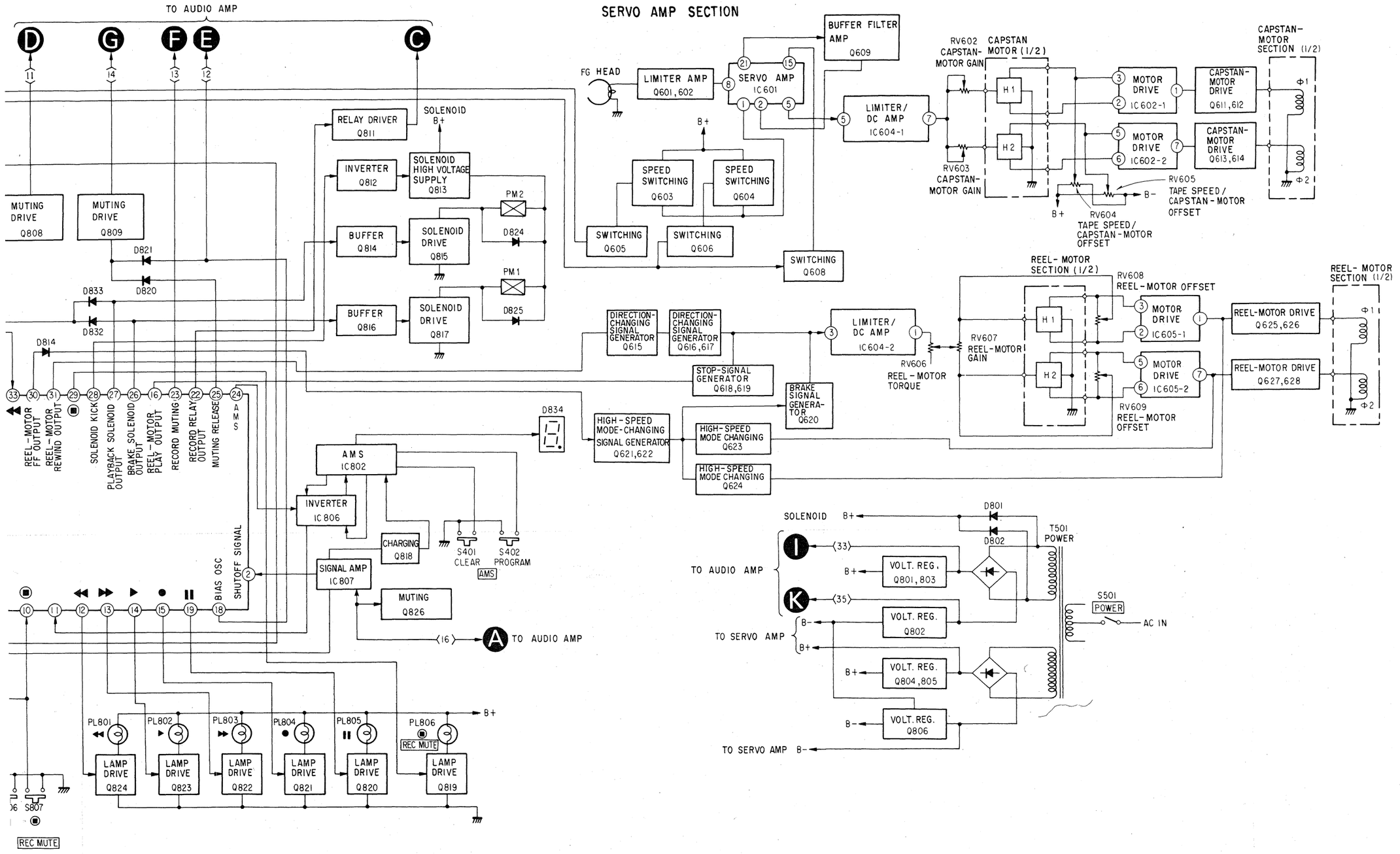


Fig. 30

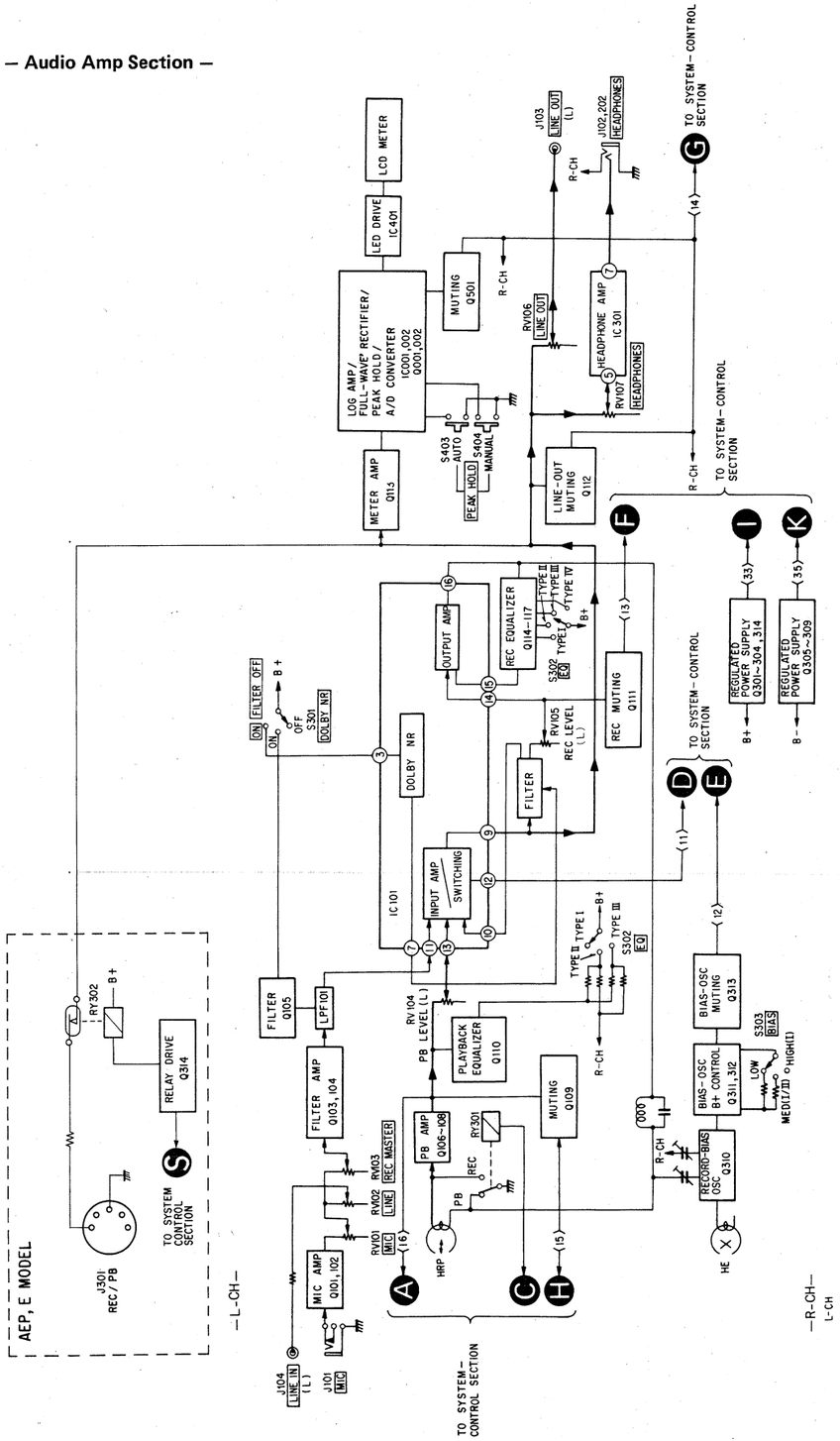
1-5. BLOCK DIAGRAM

1) — System Control Section —




TO AUDIO AMP
SERVO AMP SECTION
FG HEAD
LIMITER AMP Q601,602
SERVO AMP IC601
BUFFER FILTER AMP Q609
LIMITER/ DC AMP IC604-1
RV602 CAPSTAN-MOTOR GAIN
CAPSTAN MOTOR (1/2)
RV603 CAPSTAN-MOTOR GAIN
MOTOR DRIVE IC602-1
MOTOR DRIVE IC602-2
CAPSTAN-MOTOR DRIVE Q611,612
CAPSTAN-MOTOR DRIVE Q613,614
CAPSTAN-MOTOR SECTION (1/2)
RV605 TAPE SPEED/ CAPSTAN-MOTOR OFFSET
RV604 TAPE SPEED/ CAPSTAN-MOTOR OFFSET
SPEED SWITCHING Q603
SPEED SWITCHING Q604
SWITCHING Q605
SWITCHING Q606
SWITCHING Q608
RELAY DRIVER Q811
SOLENOID B+
INVERTER Q812
SOLENOID HIGH VOLTAGE SUPPLY Q813
BUFFER Q814
SOLENOID DRIVE Q815
BUFFER Q816
SOLENOID DRIVE Q817
PM2
PM1
D824
D825
MUTING DRIVE Q808
MUTING DRIVE Q809
D821
D820
D833
D832
D814
DIRECTION-CHANGING SIGNAL GENERATOR Q615
DIRECTION-CHANGING SIGNAL GENERATOR Q616,617
LIMITER/ DC AMP IC604-2
RV606 REEL-MOTOR TORQUE
RV607 REEL-MOTOR GAIN
REEL-MOTOR SECTION (1/2)
RV608 REEL-MOTOR OFFSET
RV609 REEL-MOTOR OFFSET
MOTOR DRIVE IC605-1
MOTOR DRIVE IC605-2
REEL-MOTOR DRIVE Q625,626
REEL-MOTOR DRIVE Q627,628
REEL-MOTOR SECTION (1/2)
STOP-SIGNAL GENERATOR Q618,619
BRAKE SIGNAL GENERATOR Q620
HIGH-SPEED MODE-CHANGING SIGNAL GENERATOR Q621,622
HIGH-SPEED MODE CHANGING Q623
HIGH-SPEED MODE CHANGING Q624
D834
AMS IC802
INVERTER IC806
CHARGING Q818
SIGNAL AMP IC807
MUTING Q826
S401 CLEAR
S402 PROGRAM
AMS
BIAS OSC
SHUTOFF SIGNAL
REEL-MOTOR FF OUTPUT
REEL-MOTOR REWIND OUTPUT
SOLENOID KICK
PLAYBACK SOLENOID OUTPUT
BRAKE SOLENOID OUTPUT
REEL-MOTOR PLAY OUTPUT
RECORD MUTING
RECORD RELAY OUTPUT
MUTING RELEASE
AMS
TO AUDIO AMP
B+
PL801
PL802
PL803
PL804
PL805
PL806
REC MUTE
LAMP DRIVE Q824
LAMP DRIVE Q823
LAMP DRIVE Q822
LAMP DRIVE Q821
LAMP DRIVE Q820
LAMP DRIVE Q819
S807
REC MUTE
SOLENOID B+
D801
D802
T501 POWER
TO AUDIO AMP
VOLT. REG. Q801,803
VOLT. REG. Q802
VOLT. REG. Q804,805
VOLT. REG. Q806
TO SERVO AMP
S501 POWER
AC IN

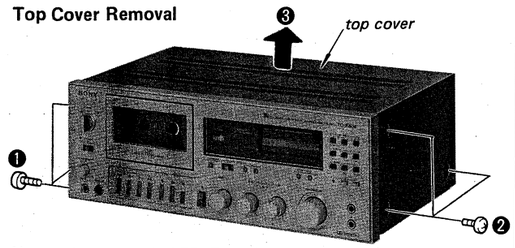
2) — Audio Amp Section —



SECTION 2
DISASSEMBLY

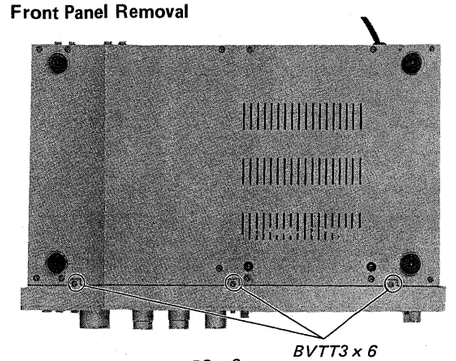
- Follow the disassembly procedure in the numerical order given.

Top Cover Removal

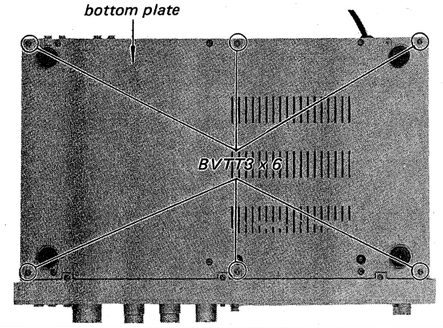


Note: photograph is AEP, E model

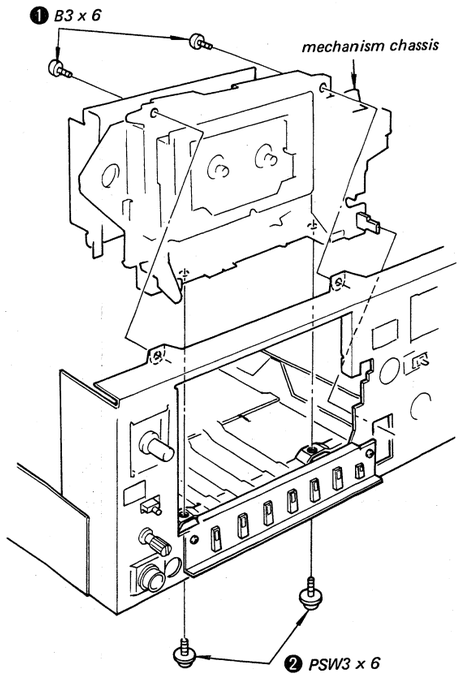
Front Panel Removal



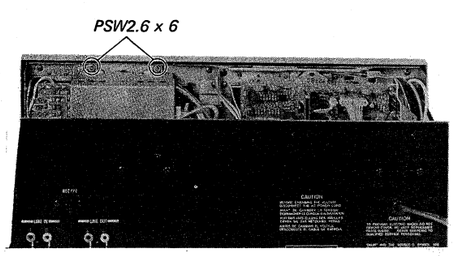
Bottom Plate Removal



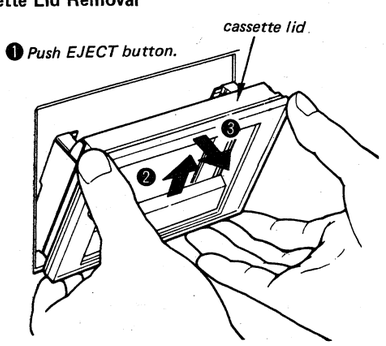
Mechanism Chassis Removal



LCD Meter Block Removal



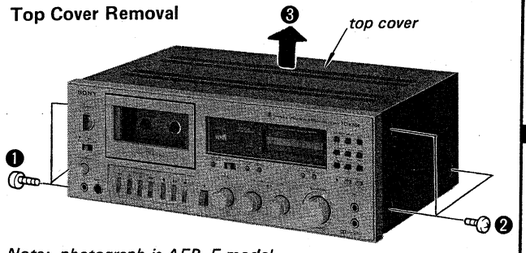
Cassette Lid Removal



SECTION 2
DISASSEMBLY

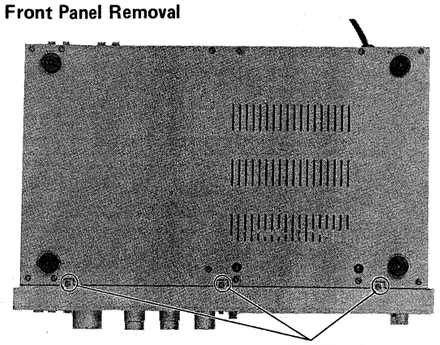
- Follow the disassembly procedure in the numerical order given.

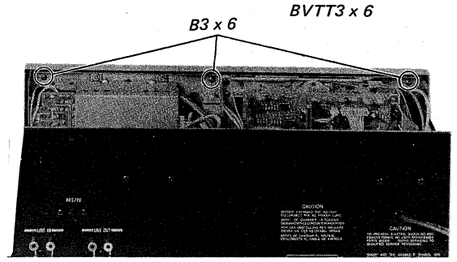
Top Cover Removal



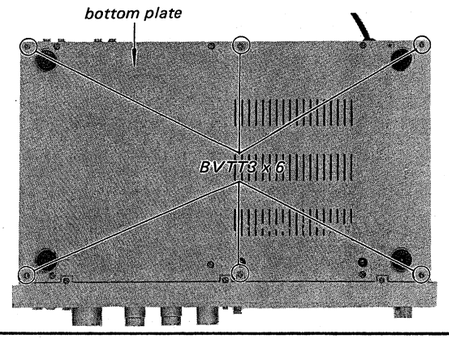
Note: photograph is AEP, E model

Front Panel Removal

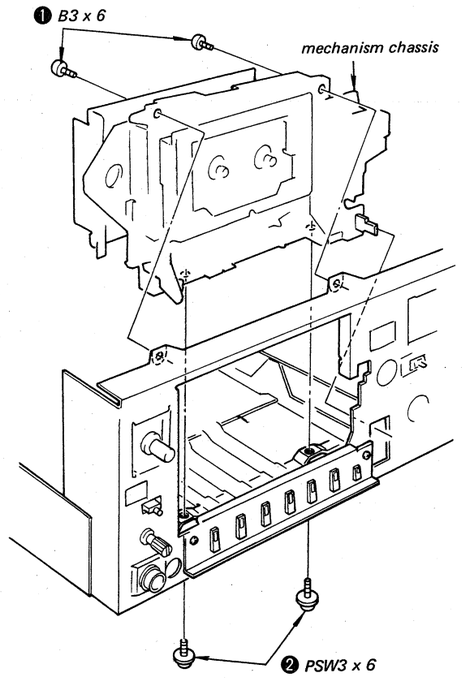




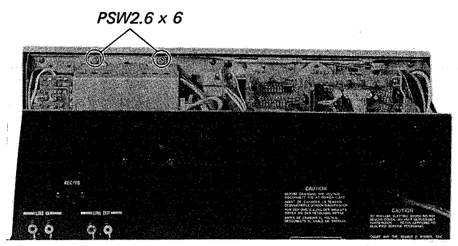
Bottom Plate Removal



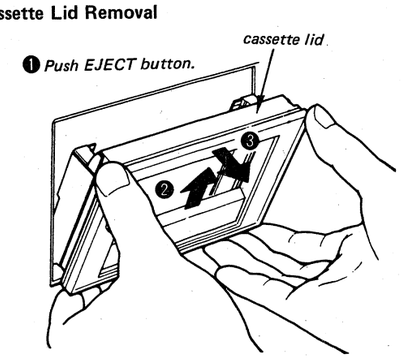
Mechanism Chassis Removal



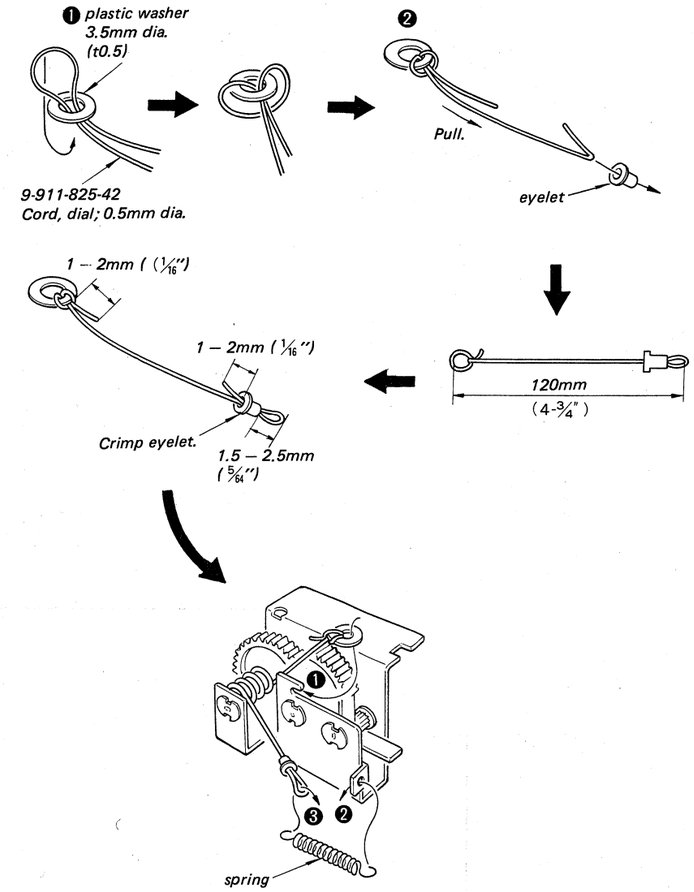
LCD Meter Block Removal



Cassette Lid Removal



Cord Stringing of Cassette-Lid Control Mechanism



SECTION 3
ADJUSTMENTS

PRECAUTION

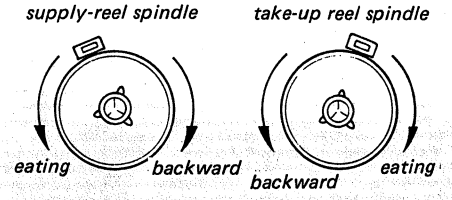
1. Clean the following parts with a denatured-alcohol-moistened swab:

   record/playback head — pinch roller
   erase head — rubber belts
   capstan — idlers

2. Demagnetize the record/playback head with a head demagnetizer.
3. Do not use a magnetized screwdriver for the adjustments.
4. After the adjustments, apply a suitable locking compound to the parts adjusted.
5. The adjustments should be performed with the rated power supply voltage unless otherwise noted.

Brake Torque Measurement
— Stop Mode —

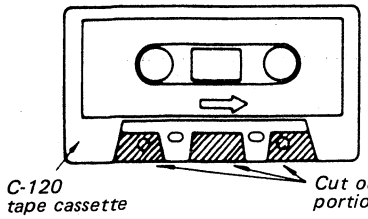
	Torque meter	Torque
Eating direction	Tonichi model	50 – 200g·cm (0.69 – 2.67oz·inch)
Backward direction		20 – 100g·cm (0.27 – 1.39oz·inch)



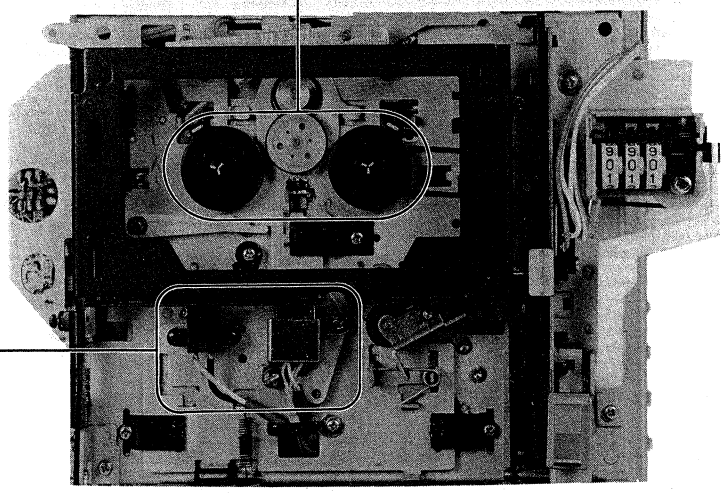
3-1. MECHANICAL ADJUSTMENTS

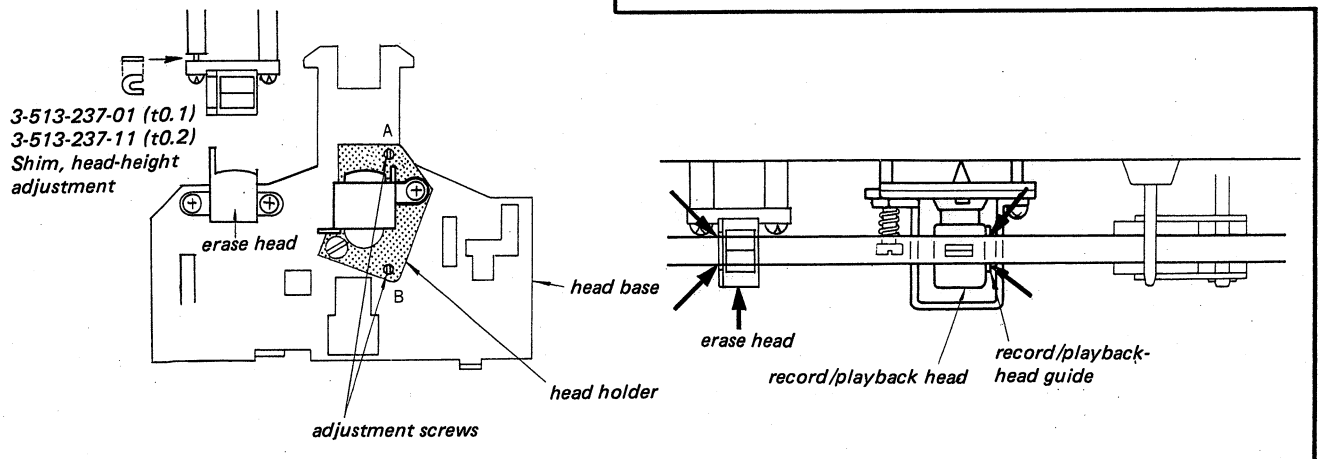
Head Height Adjustment
— Playback Mode —

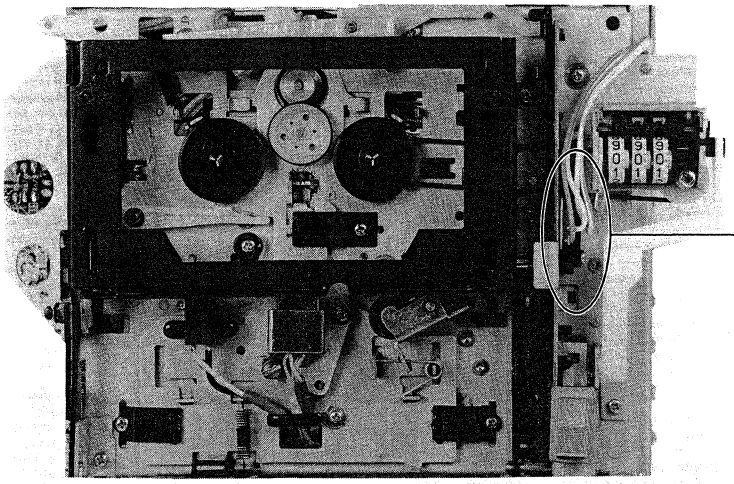
1. Make an adjustment cassette as shown below, or use a mirror cassette.



2. In playback mode and viewing from the front, adjust the head heights to eliminate tape curl and tape twist at arrowed portions.

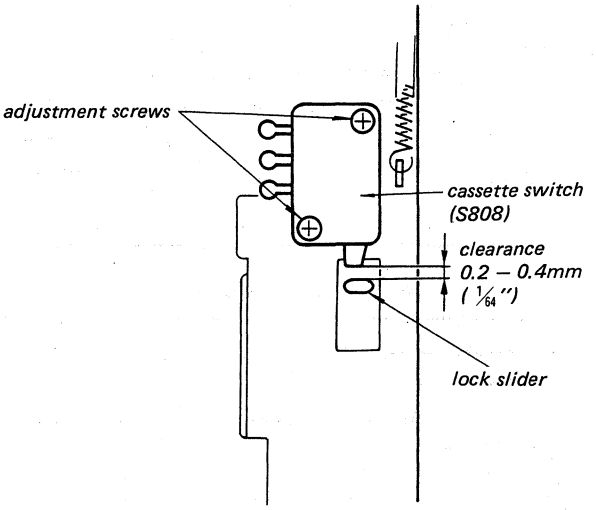






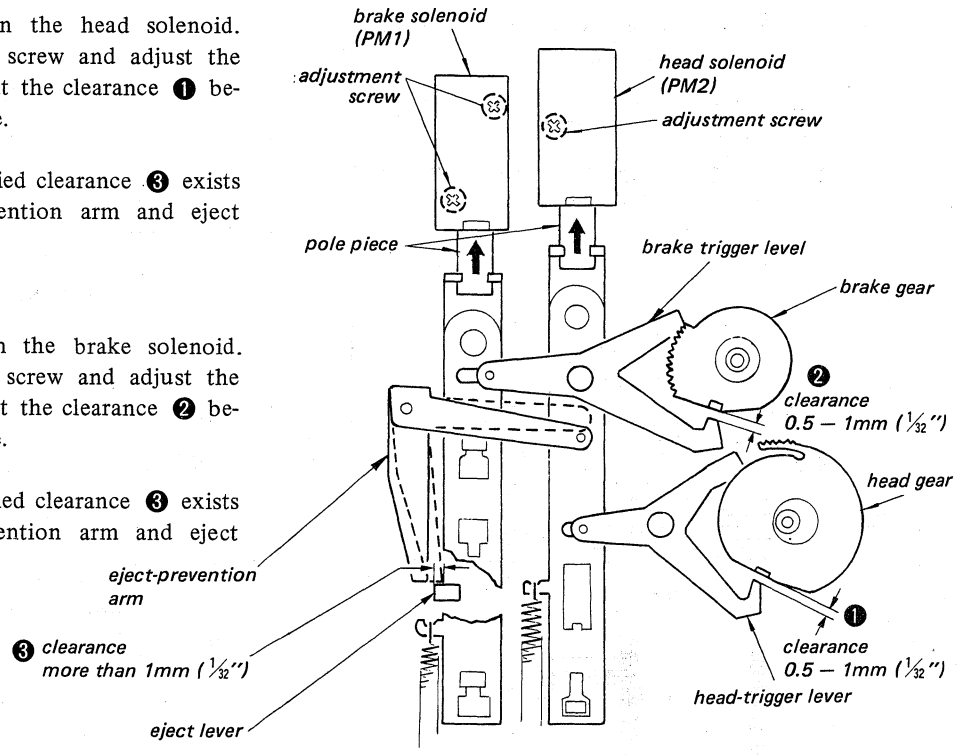
Cassette Switch (S808) Position Adjustment
– Stop Mode –

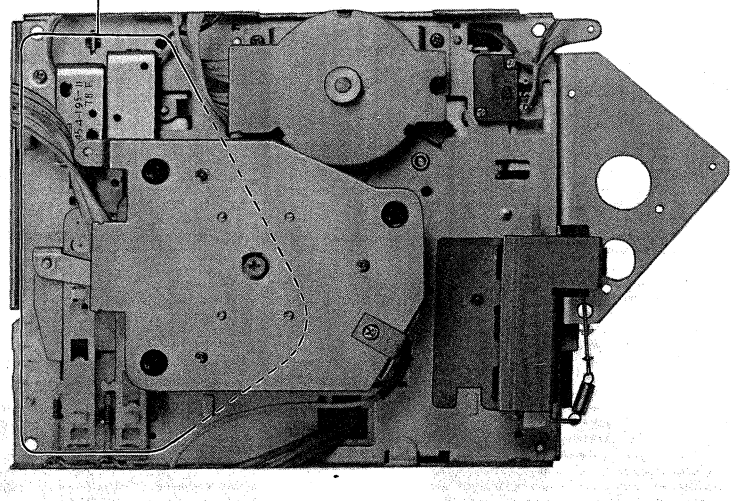
1. Push EJECT button and open the cassette lid.
2. Loosen the adjustment screw and adjust the switch position so that the clearance between the switch-tip end and lock slider becomes the specified value.
3. Tighten the screws after the adjustment.



Solenoid Position Adjustment

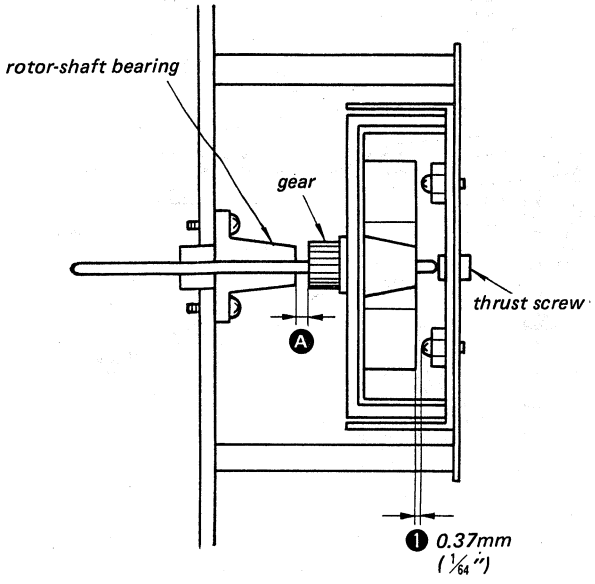
1. Head Solenoid (PM2)
   1) Push the pole piece in the head solenoid.
   2) Loosen the adjustment screw and adjust the solenoid position so that the clearance ❶ becomes the specified value.
   3) Tighten the screw.
   4) Confirm that the specified clearance ❸ exists between the eject-prevention arm and eject lever.
   5) Release the pole piece.
2. Brake Solenoid (PM1)
   1) Push the pole piece in the brake solenoid.
   2) Loosen the adjustment screw and adjust the solenoid position so that the clearance ❷ becomes the specified value.
   3) Tighten the screw.
   4) Confirm that the specified clearance ❸ exists between the eject-prevention arm and eject lever.
   5) Release the pole piece.





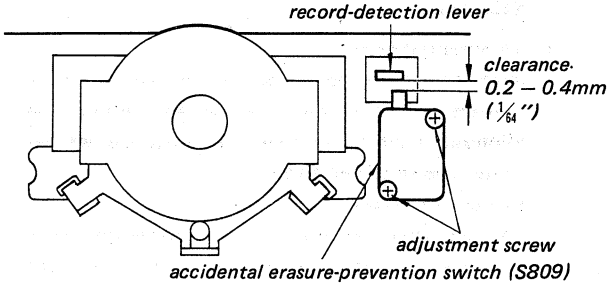
Rotor Thrust Adjustment
– Playback Mode –

1. Loosen and then tighten the thrust screw until the rotor just starts rotating.
2. Further tighten the screw in ¾ turns so that the clearance ❶ becomes 0.37mm (1/64").
3. Confirm a clearance Ⓐ should exist between the gear and rotor-shaft bearing.



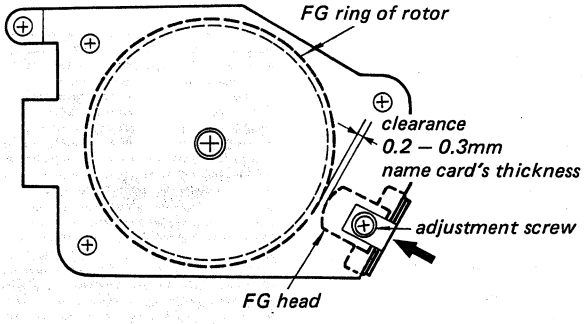
Accidental Erasure Prevention Switch (S809) Position Adjustment
– Stop Mode –

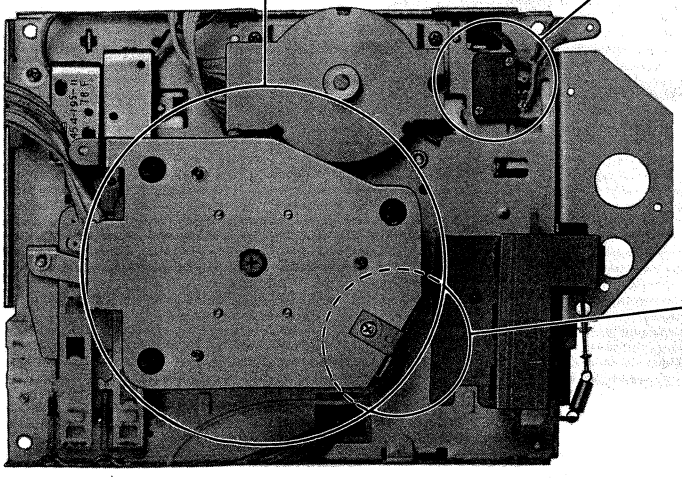
1. Install a tape cassette with miserasure prevention claws.
2. Loosen the adjustment screws, and adjust the switch position to obtain the specified clearance.
3. Tighten the screws after the adjustment.

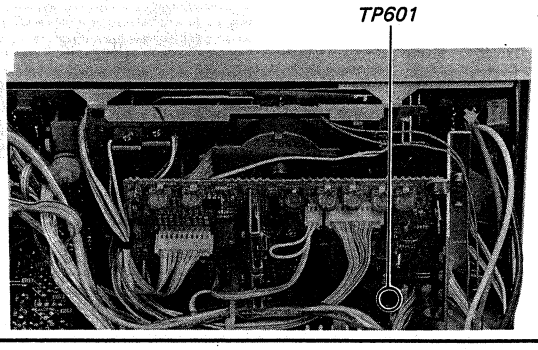


FG Head Position Adjustment
– Stop and Playback Modes –

1. In stop mode, loosen the adjustment screw and insert a name card between the rotor's FG ring and FG head so that the clearance becomes the specified value.
2. Tighten the screw, and remove the name card.
3. In playback mode, confirm that FG output of 100mVp-p – 200mVp-p present at TP601 on the servo-amp circuit board.

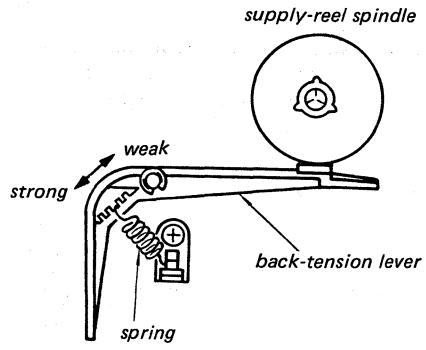


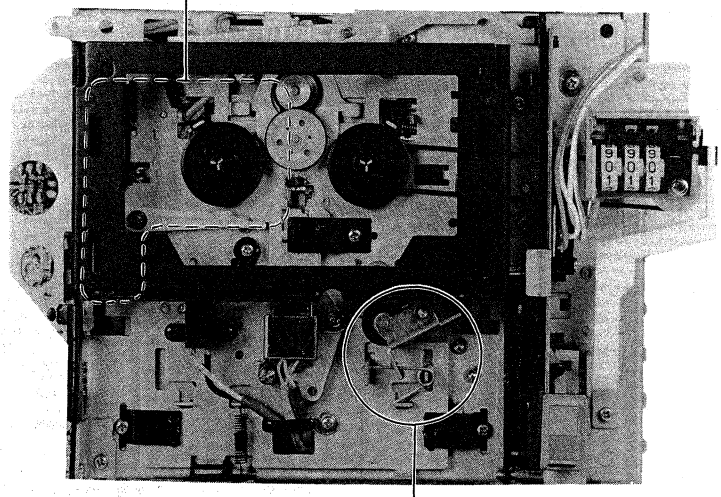




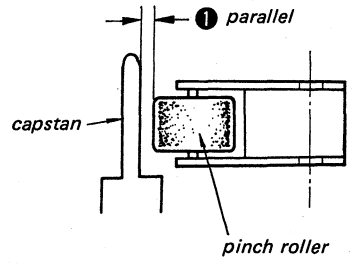
Forward Back-tension Adjustment
– Playback Mode –

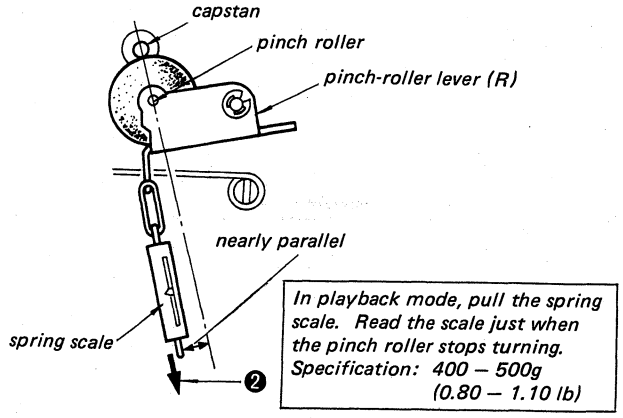
1. Install Sony Torque Meter CQ-102A in the set.
2. Adjust the spring-hooking position to obtain a forward back-tension torque of 2 – 5g·cm (0.03 – 0.06oz·inch).





Pinch-Roller Pressure Measurement
– Playback Mode –





In playback mode, pull the spring scale. Read the scale just when the pinch roller stops turning.
Specification: 400 – 500g (0.80 – 1.10 lb)

3-2. ELECTRICAL ADJUSTMENTS

Note: The adjustment should be performed in the order given in this service manual. The adjustments should be performed for both L-CH and R-CH.

- Set the BIAS and EQ switches according to the tape as follows.

Tape	BIAS switch	EQ switch
CS-10	MED	TYPE I
CS-25	HIGH	TYPE II
CS-30	MED	TYPE III
CS-40	TYPE IV	TYPE IV

- Switches and controls should be set as follows unless otherwise specified.

DOLBY NR switch: OFF
EQ switch: TYPE I
BIAS switch: MED
LINE OUT control: 10 (max)
MIC control: 10 (max)
LINE control: 10 (max)
REC MASTER control:
at the position where the standard LINE OUT level is obtained with the standard MIC or LINE IN input level.
TIMER switch: OFF
MEMORY AMS switch: OFF
REC MUTE switch: OFF

- Standard Record:

Deliver the standard input signal level to the input jack and set the REC LEVEL control to obtain the standard output signal level.

Standard Input Level

	MIC	LINE IN
source impedance	300Ω or 600Ω	10kΩ
input level	0.77mV (−60dB)	0.25V (−10dB)

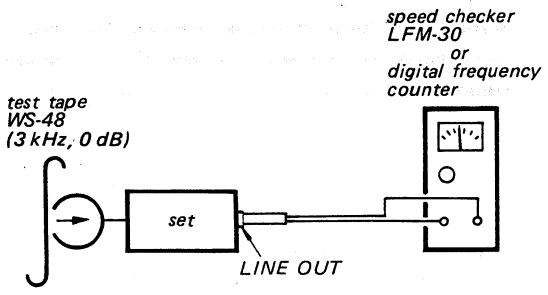
Standard Output Level

	LINE OUT	HEADPHONES
load impedance	47kΩ	
output level	0.44V (−5dB)	0.775V (0dB)

Tape Speed Adjustment

Procedure:

Mode: playback



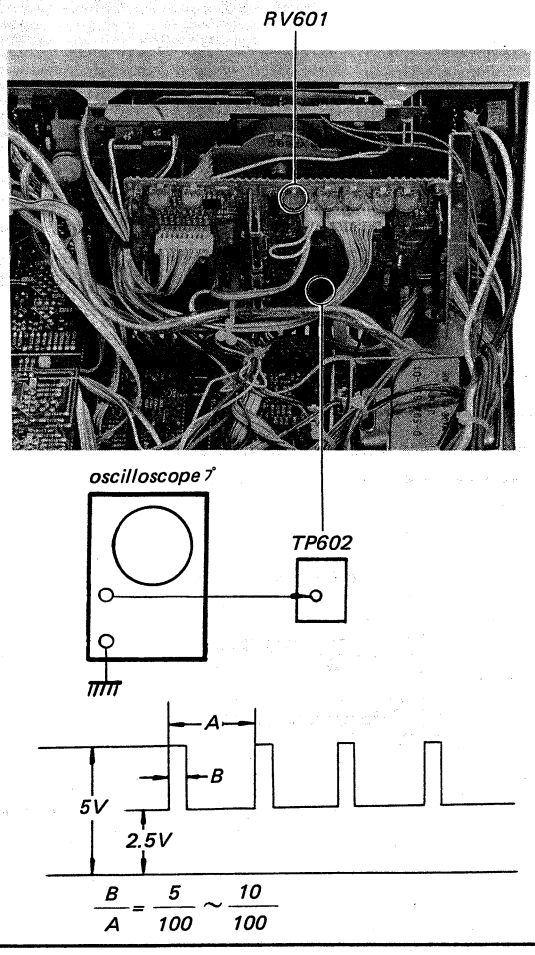
Specification:

Speed checker	Digital frequency counter
−0.3 to +0.3%	2,990 to 3,010Hz

Frequency difference between the beginning and the end of the tape should be within 0.3% (10Hz).

Adjustment Location:

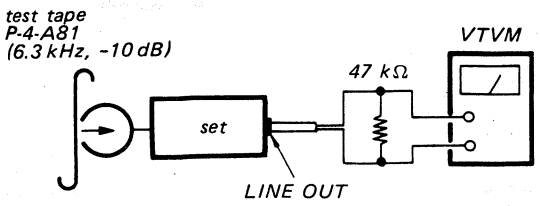
– survo amp board –



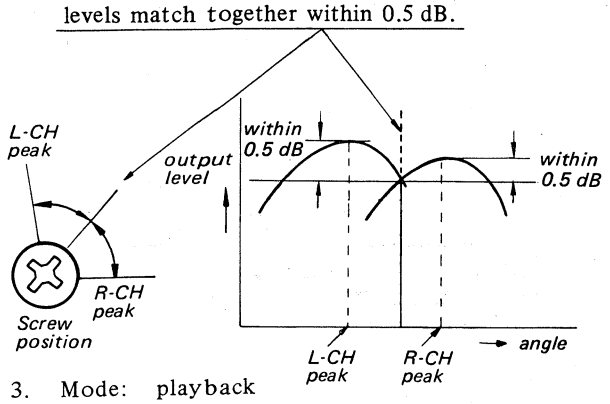
Record/playback Head Azimuth Adjustment

Procedure:

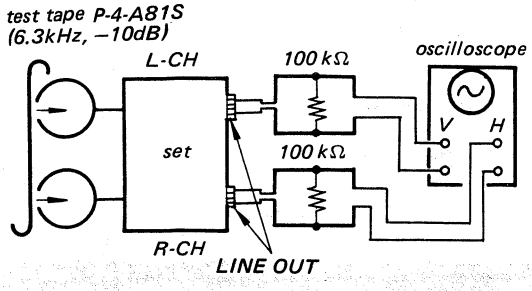
1. Mode: playback

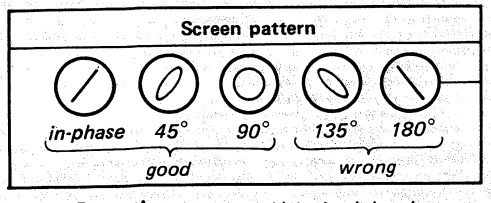


2. Turn the adjustment screw for the maximum output levels. If these levels do not match, turn the adjustment screw until both of output levels match together within 0.5 dB.

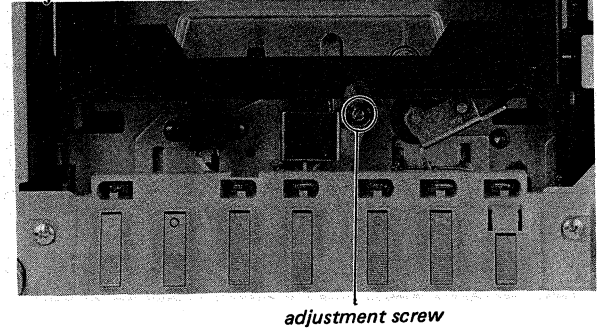


3. Mode: playback





Adjustment Location: *– record/playback head –*

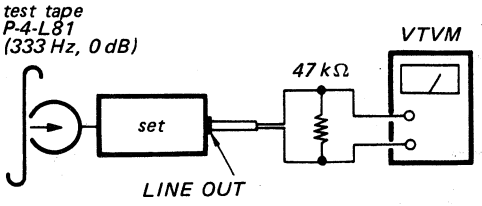


Playback Level Adjustment

Setting:

TAPE SELECT switch: TYPE I

Procedure:



Adjust RV104 (L-CH) and RV204 (R-CH) to obtain the specified LINE OUT level.

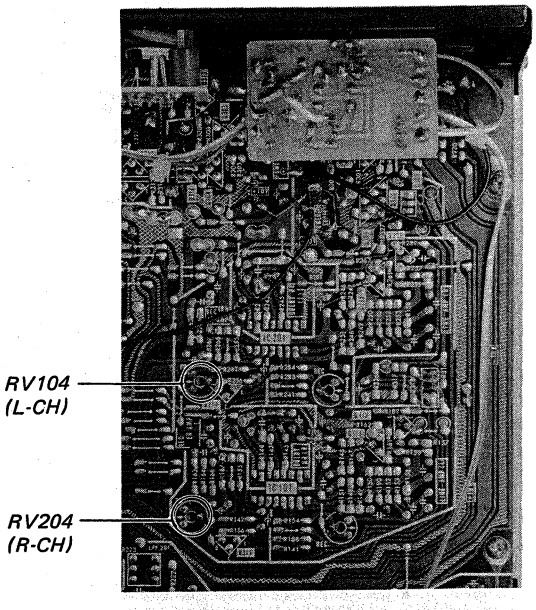
Specification:

LINE OUT level: 0.52 – 0.58V
(–3.5 to –2.5dB)
Level difference between channels:
less than 1dB

Check that the LINE OUT level does not change in playback mode while changing the mode from playback to stop several times.

Adjustment Location:

– audio amp board –



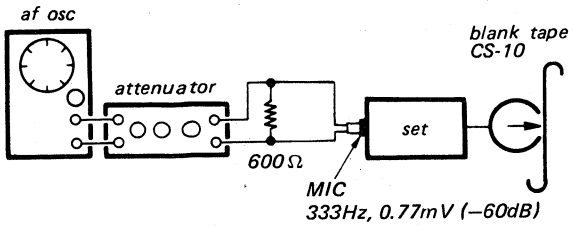
Record Level Adjustment

Setting:

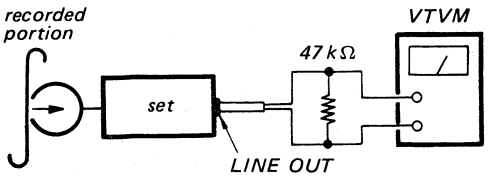
TAPE SELECT switch:	TYPE I
DOLBY NR switch:	OFF
REC MASTER control:	standard record (See page 40.)

Procedure:

1. Mode: record



2. Mode: playback

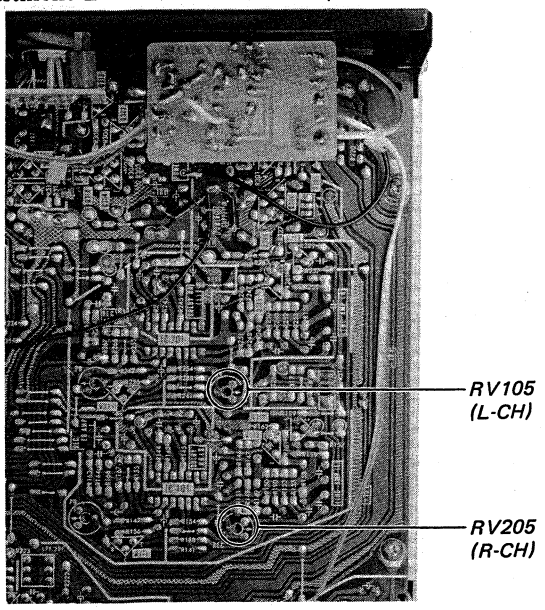


Adjust RV105 (L-CH) and RV205 (R-CH) to obtain 0.44V (–5dB) LINE OUT level.

Specification:

LINE OUT level:	0.39 – 0.49V (–6 to –4dB)

Adjustment Location: *– audio amp board –*



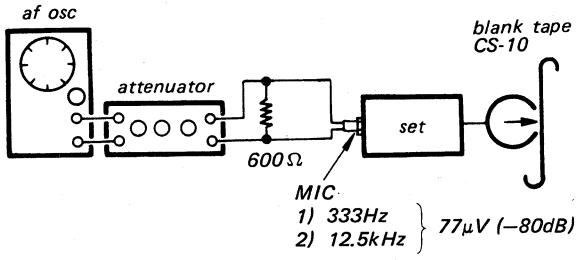
Record Bias Adjustment

Setting:

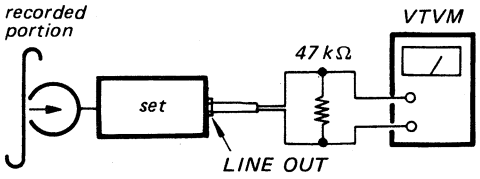
REC MASTER control:	standard record (See page 40.)

Procedure:

1. Mode: record



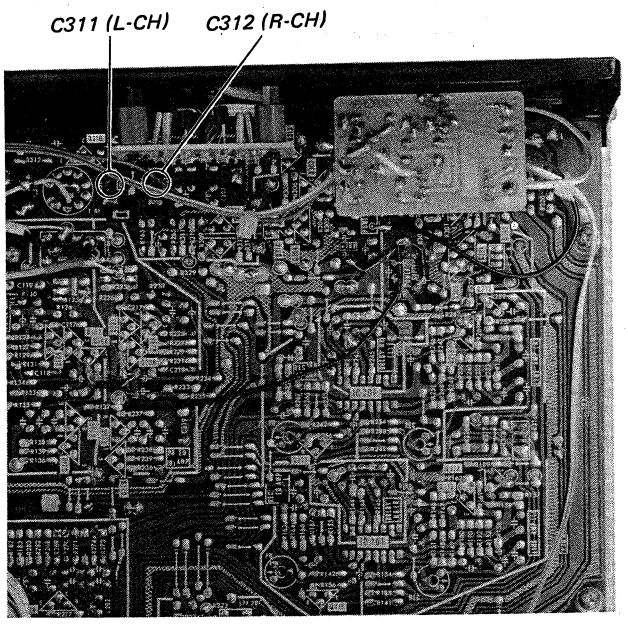
2. Mode: playback



Play back both frequencies, adjust C311 (L-CH) and C312 (R-CH) for the same VTVM reading.

Adjustment Location:

– audio amp board –



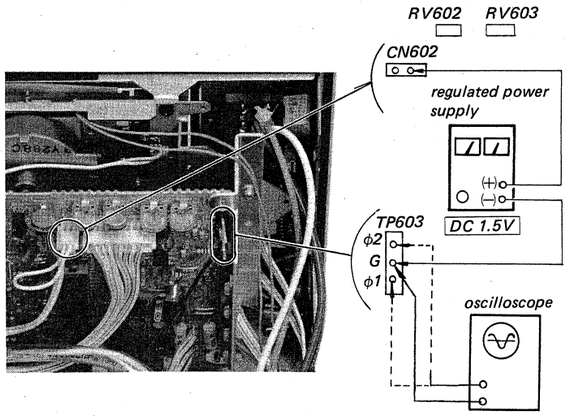
Capstan Motor Adjustment

Setting:

POWER switch: ON
Mode: stop

Procedure:

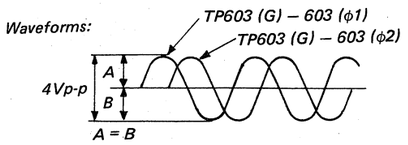
1. Remove CN602.
2. Apply 1.5V dc and connect an oscilloscope as follows.



3. Adjust adjustable resistors.

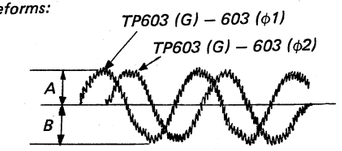
Oscilloscope connection	Adjust	Waveform
TP603 (G) and TP603 (ϕ1)	RV604	A = B
	RV602	4Vp-p
TP603 (G) and TP603 (ϕ2)	RV605	A = B
	RV603	4Vp-p

Waveforms:

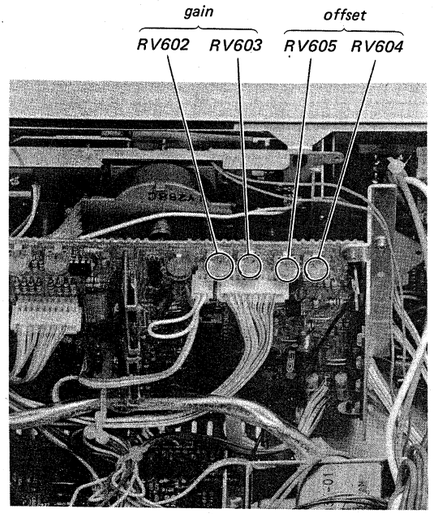


4. Reconnect CN602, install a tape cassette and set in playback mode.
5. Adjust RV604 and RV605 to obtain a symmetrical waveforms as shown.

Waveforms:



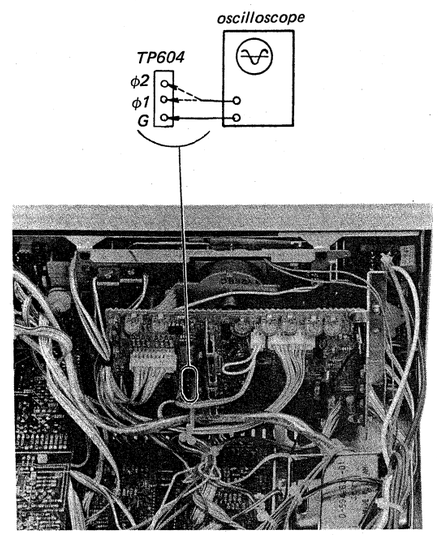
Adjustment Location:
– servo amp board –



Reel Motor Adjustment

Procedure:

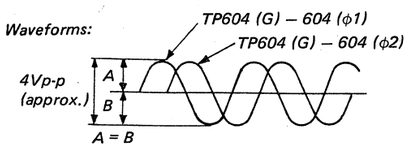
1. Connect an oscilloscope as follows.



2. Set the tapecorder in playback mode without a tape cassette.
3. Adjust RV608 and RV609.

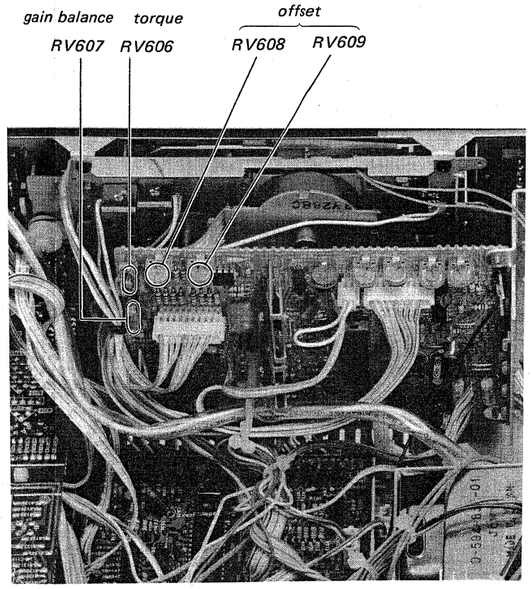
Oscilloscope connection	Adjust	Obtain
TP604 (G) and TP604 (ϕ1)	RV608	Waveform A = B
TP604 (G) and TP604 (ϕ2)	RV609	

Waveforms:



4. Adjust RV607 to make the above two waveforms the same level, approximately 4Vp-p.
5. Install a torque meter CQ-101A in the set. Adjust RV606 to obtain 40 – 45g·cm (0.56 – 0.62oz·inch) of forward torque.
6. Install a blank tape in the set and readjust step 2 in playback mode.

Adjustment Location:
– servo amp board –



LCD Meter Adjustment

Setting:

PEAK HOLD switch: MANUAL

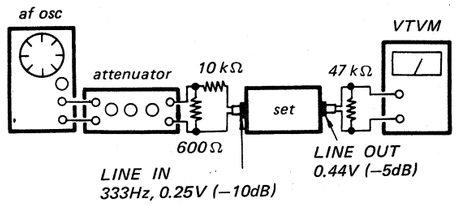
REC MASTER control:

to obtain 0.44V (−5dB) output at LINE OUT with 0.25V (−10dB) input at LINE IN

Procedure:

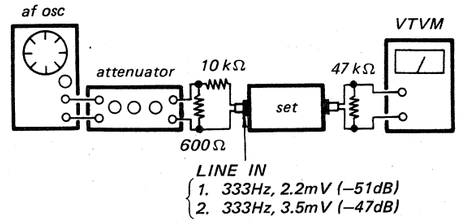
Note: When adjusting the following adjustable resistors, turn them in the direction to decrease the indications and set the resistors just when an indication element disappears.

1. Mode: record



Adjust RV501 (L-CH) and RV401 (R-CH) to make the right-most indication element place on 0VU (−4dB).

2. Mode: record

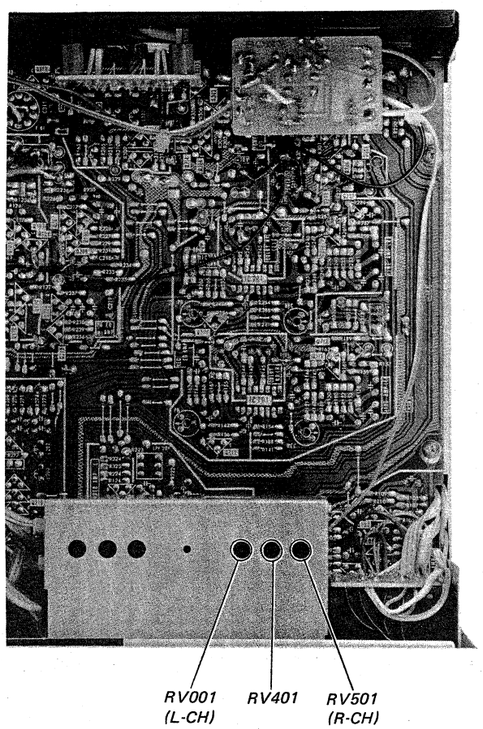


With 2.2mV (−51dB) input, adjust RV001 to make the left-most indication element light up. With 3.5mV (−47dB) input, readjust RV001 to make the first two indication eléments light up.

3. Repeat steps 1 and 2.

Adjustment Location:

– LCD unit –



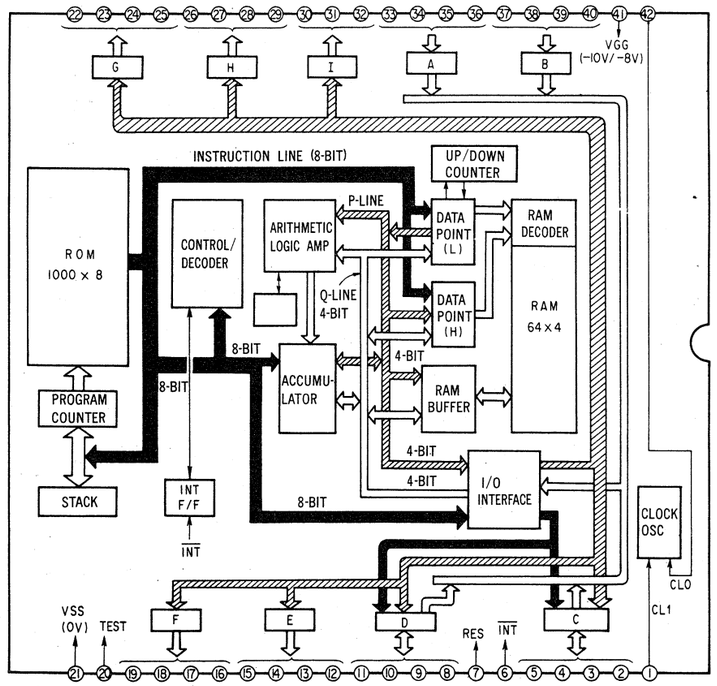
Note (System Control and Servo Amp Sections)

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- : fusible resistor.
- : internal component.
- : B+ bus.
- : B− bus.
- : panel designation.
- : adjustment for repair.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  - ◀◀ : rewind
  - ▶ : playback
  - ▶▶ : fast forward
  - ● : record
  - ▮▮ : pause
  - ◉ : REC MUTE
  - ■ : stop

  no mark: stop
- Waveforms are taken in playback mode.
- Switch

Ref. No.	Switch	Position
S401	CLEAR	OFF
S402	PROGRAM	OFF
S501	POWER	OFF
S801	REW	OFF
S802	STOP	OFF
S803	FWD	OFF
S804	FF	OFF
S805	REC	OFF
S806	PAUSE	OFF
S807	REC MUTE	OFF
S808	CASSETTE	OFF
S809	MISERASURE PREVENTION	OFF
S810-1, 2	TIMER	OFF
S811	TAPE COUNTER	OFF
S812	MEMORY	OFF

IC801 μPD547-027



SECTION 4
DIAGRAMS

4-1. SCHEMATIC DIAGRAM

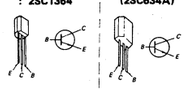
– System Control and Servo Amp Sections –

See page 46 for note.

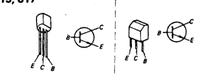
Replacement Semiconductors

For replacement, use semiconductors except in ( ).

Q601, 602, 605
Q606, 608, 609 : 2SC1364 (2SC633A)
Q615, 618, 619
Q621, 623, 624
Q617, 620 : 2SC1364 (2SC634A)



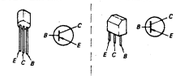
Q801, 803, Q815, 817: 2SC1474 (2SD471)



IC801: μPD547-027

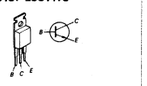
Q603, 604, Q616, 622: 2SA1027R (2SA678)
Q808, 809, Q818: 2SA1027R (2SA1015)

Q802, 813: 2SA684 (2SB564)

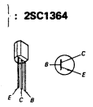


IC802: MSM5953

Q611, 613: 2SC1173



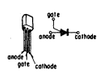
Q805, 811, 812, Q814, 816, Q819–826: 2SC1364



IC803 : μPC339C
IC805, 806 : MSM4069

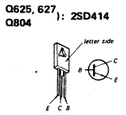
Q612, 614: 2SA473

Q827: N13T1

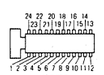


D601, 602, 605, D811–822, D824–833, 835: 1S1555 (1T40)
D801–810, 823 : 10E2

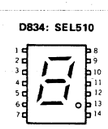
Q625, 627, Q804: 2SD414



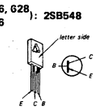
IC601: CX193



D834: SEL510

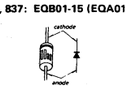


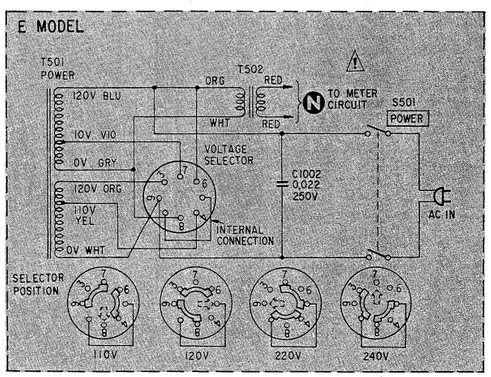
Q626, 628, Q806: 2SB548

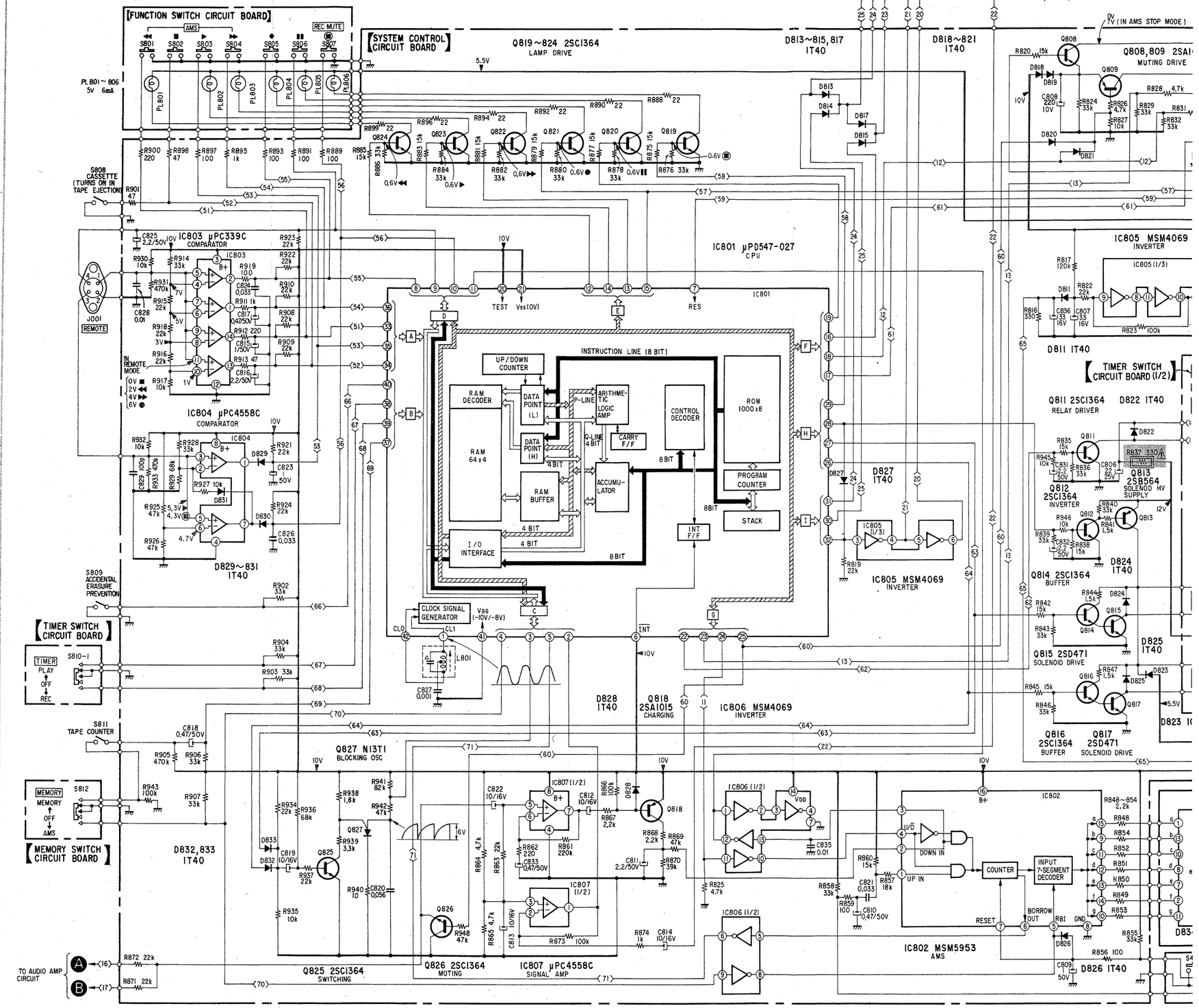


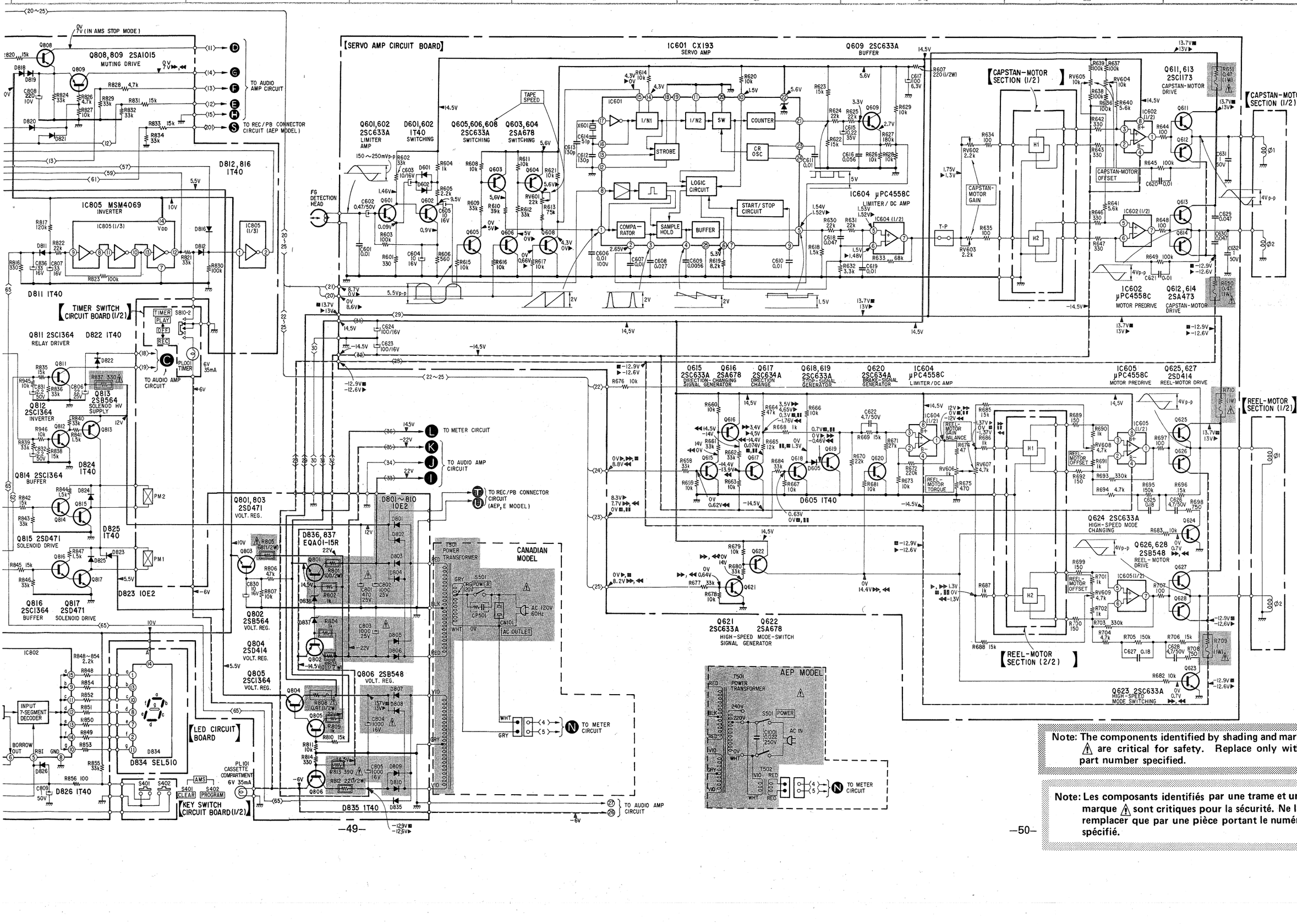
IC602, 604, 605, IC804, 807: μPC4558C

D836, 837: EQB01-15 (EQA01-15R)





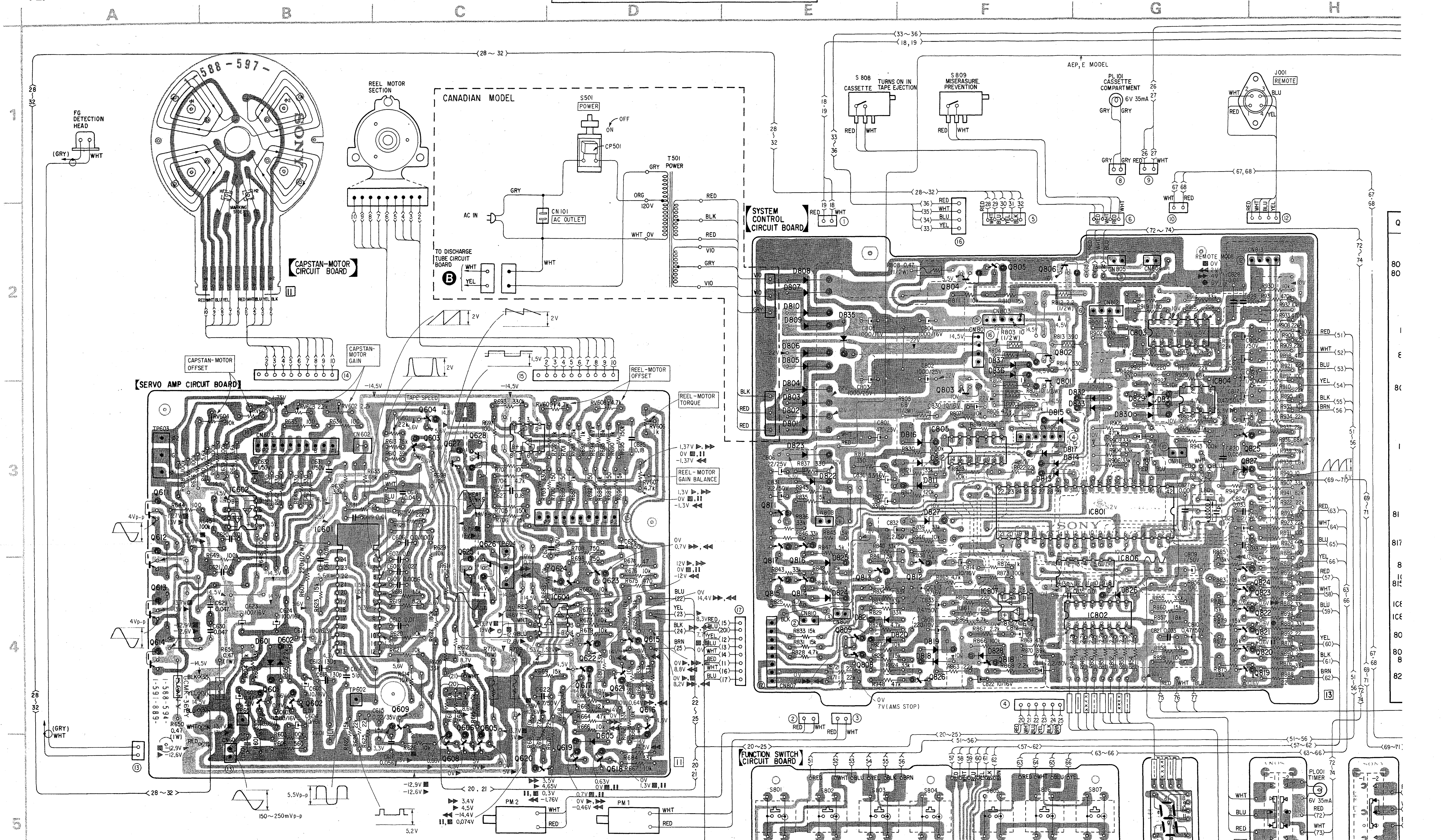




Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

4-2. MOUNTING DIAGRAM – System Control and Servo Amp Sections –



Q IC	611 612 613 614	IC602	601	602	IC601	603 604 609	627 628 625 626 608, 606, 605	IC605 620	IC604	624 622,623 617 619 618	621	615	616	Q IC
D			601, 602							605				D

TC-K80 II

D E F G H I J K L

1 2 3 4 5

TO AUDIO AMP CIRCUIT BOARD

TO REC/PB CONNECTOR CIRCUIT BOARD (AEP/E MODEL)

AEP, E MODEL

S 808 CASSETTE TURNS ON IN TAPE EJECTION

S 809 MISERASURE PREVENTION

PL101 CASSETTE COMPARTMENT 6V 35mA

J001 REMOTE

T501 POWER

SYSTEM CONTROL CIRCUIT BOARD

REEL-MOTOR OFFSET

REEL-MOTOR TORQUE

REEL-MOTOR GAIN BALANCE

FUNCTION SWITCH CIRCUIT BOARD

S801 S802 S803 S804 S805 S806 S807

PL801 PL802 PL803 PL804 PL805 PL806

AMS REC MUTE

LED CIRCUIT BOARD

S810 TIMER

TIMER SWITCH CIRCUIT BOARD

S812 MEMORY

MEMORY SWITCH CIRCUIT BOARD

S811 TAPE COUNTER

TO KEY-SWITCH CIRCUIT BOARD

TO AUDIO AMP CIRCUIT BOARD

REC/PB CONNECTOR BOARD (AEP,E MODEL)

Q, IC	D
805,806	
804	808
	807
	810
	809
IC803	835
802	806
	805,837
	836
801	
803	804
IC804	832,829
	803 831
	833
	802,830
825	815
	801
IC805	816
	823,817
	812
827	814
	813
	822
	811
IC801	
811	827
817,816	
812	825
813	
824	
IC806	
815,814	
823	824,826
IC807	
822	
IC802	821
809	820
808 820	819
818	828
819	818
826	

AEP MODEL

S501 POWER

C1001 0.022 (250V)

POWER SUPPLY CIRCUIT BOARD

T502

TO DISCHARGE TUBE CIRCUIT BOARD (B)

E MODEL

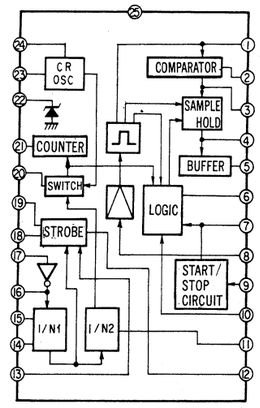
VOLTAGE SELECTOR BOARD

C1002 0.022 250V

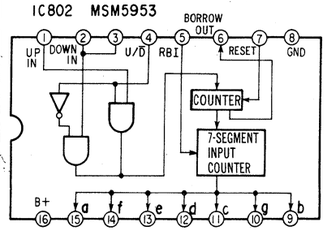
VOLTAGE SELECTOR

TO DISCHARGE TUBE CIRCUIT BOARD (B)

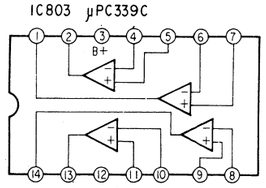
IC601 CX193



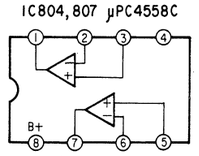
IC802 MSM5953



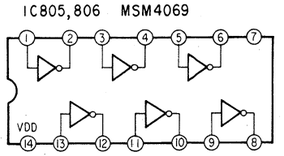
IC803 μPC339C



IC804,807 μPC4558C

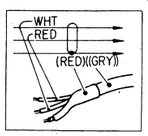


IC805,806 MSM4069

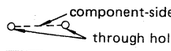


Note:

- Color code of sleeving over the end of the jacket.



- COMPONENT-SIDE PATTERN



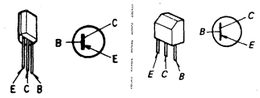
- : B + pattern.
- : B – pattern.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  - ◀◀ : rewind
  - ▶ : playback
  - ▶▶ : fast forward
  - ● : record
  - ▮▮ : pause
  - ■ : REC MUTE
  - no mark: stop

3-3. MOUNTING DIAGRAM — Audio Amp Section —

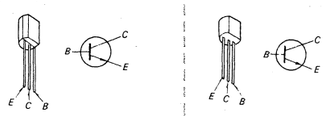
Replacement Semiconductors

For replacement, use semiconductors except in ( ).

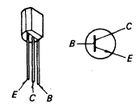
Q101, 104, 106, 108, Q201, 204, 206, 208): 2SA872 (2SA836)



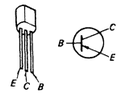
Q102, 103, 107, Q202, 203, 207): 2SC1362 (2SC1345)



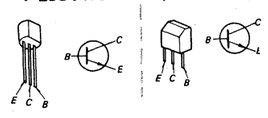
Q105, 109, 110, Q114–117, Q205, 209, 210, Q214–217, Q313 : 2SC1364



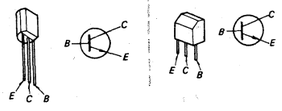
Q111, 211: 2SA952



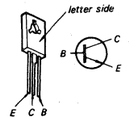
Q112, 212, 311 : 2SC1474 (2SD471)
Q310 : 2SC1475 (2SC1213A)



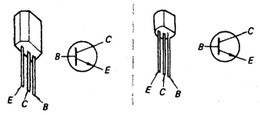
Q113, 213: 2SC1364 (2SC458A)



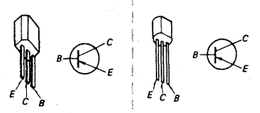
Q301: 2SD414



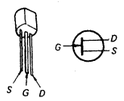
Q302, 307, 314: 2SC926A (2SC1890)



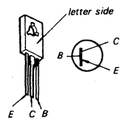
Q303, 306, 308: 2SA1027R (2SA893)



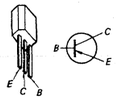
Q304, 309: 2SK30A (2SK30A-Y)



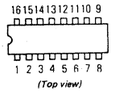
Q305: 2SB548



Q312: 2SA1027R (2SA1015)

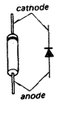


IC101, 201: CX174

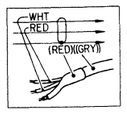


IC 301: μPC4557C

D101, 201) D303, 304 D301, 302 : 1S1555 (1T40) : HZ6B2L (HZ6B)

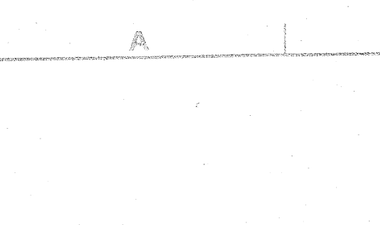


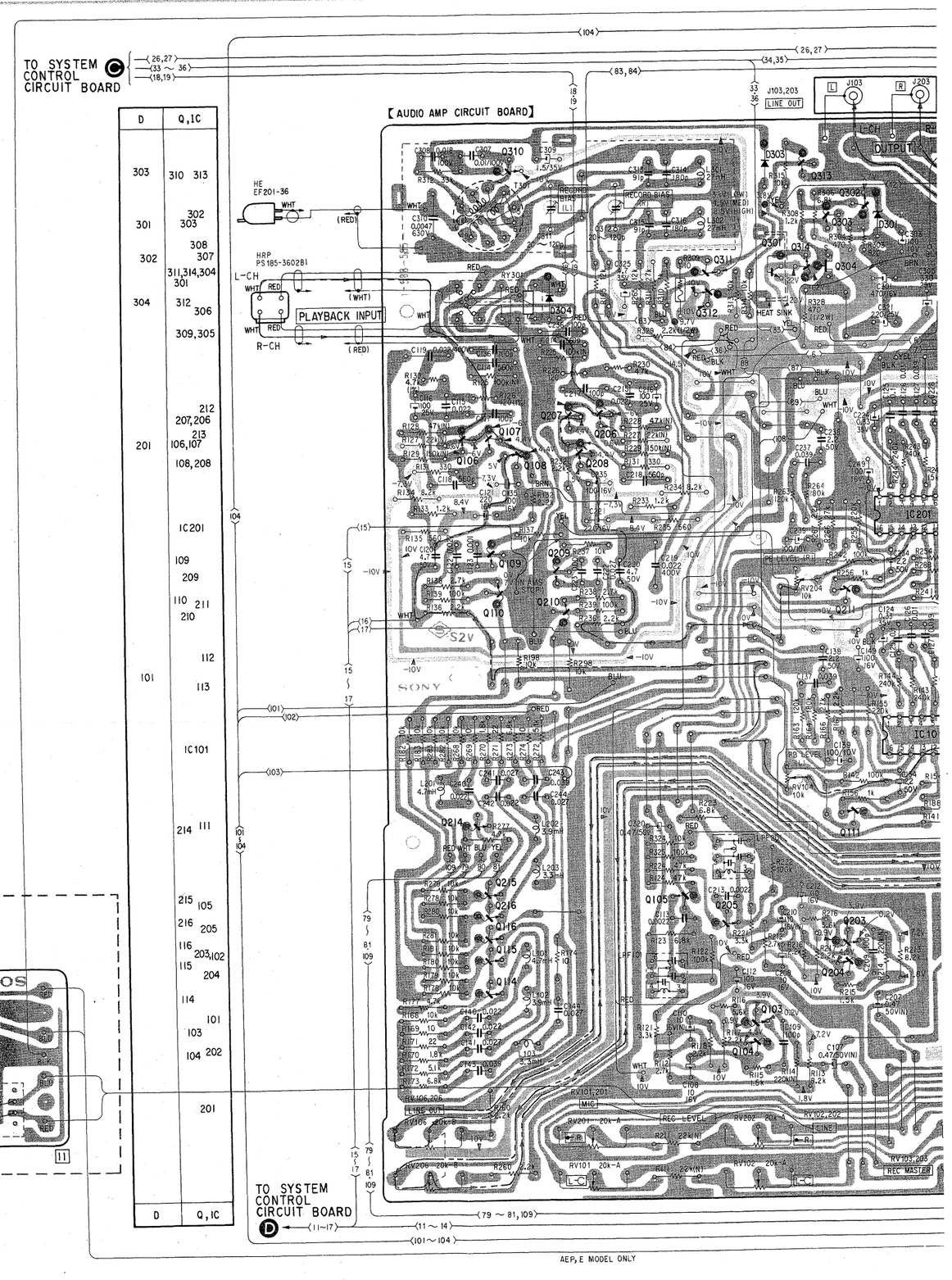
Note:
- Color code of sleeving over the end of the jacket.



- ▩ : B + pattern.
- ▩ : B – pattern.
- Signal Path
  ——→ : L-CH
  - - -→ : R-CH
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  ◀◀ : rewind
  ▶ : playback
  ▶▶ : fast forward
  ● : record
  ▮▮ : pause
  Ⓡ : REC MUTE
  ■ : stop

IC101, 201 CX174



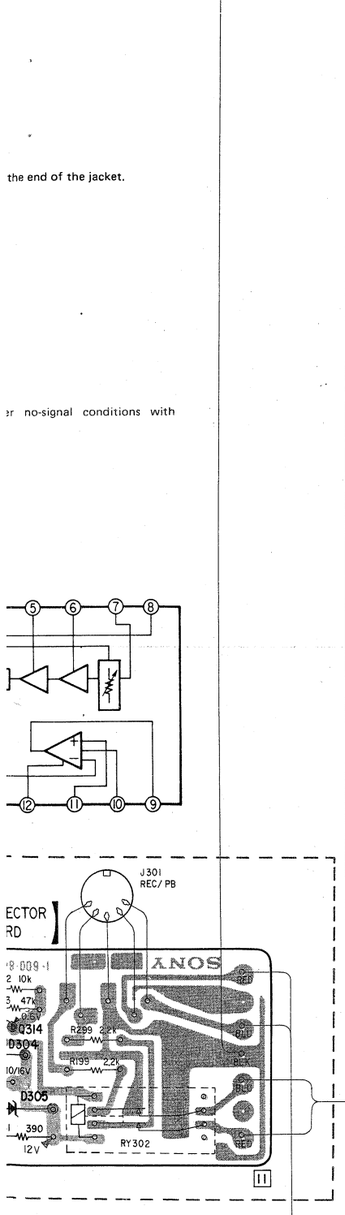


D	Q, IC
303	310 313
301	302 303
302	308 307
	311,314,304 301
304	312 306
	309,305
	212
	207,206
201	213 106,107
	108,208
	IC201
	109
	209
	110 211 210
	112
101	113
	IC101
	214 111
	215 105
	216 205
	116 203,102
	115 204
	114
	101
	103
	104 202
	201

AEP, E MODEL ONLY

the end of the jacket.

or no-signal conditions with



D	Q,IC
303	310 313
301	302 303
302	308 307
	311,314,304 301
304	312 306
	309,305
	212
	207,206
201	213 106,107
	108,208
	IC201
	109
	209
	110 211
	210
	112
101	113
	IC101
	214 111
	215 105
	216 205
	116 203,102
	115 204
	114
	101
	103
	104 202
	201

D	Q,IC

TO SYSTEM CONTROL CIRCUIT BOARD (C) ⟨26,27⟩ ⟨33 ~ 36⟩ ⟨18,19⟩

【AUDIO AMP CIRCUIT BOARD】

J103,203 LINE OUT — J103 L R J203

J104,204 LINE IN — J104 L J204 R

HE EF201-36

HRP PS185-360281

L-CH PLAYBACK INPUT R-CH

HEAT SINK

IC201 IC101

REC LEVEL REC MASTER

TO SYSTEM CONTROL CIRCUIT BOARD (D) ⟨11~17⟩ ⟨11 ~ 14⟩ ⟨101 ~ 104⟩

AEP,E MODEL ONLY

TO METER CIRCUIT BOARD (E) ⟨6 ~ 10⟩

【PUSHBUTTON-SWITCH CIRCUIT BOARD】

PL301 PL302 PL303 (IN S301-303)

S301 DOLBY NR OFF ON FILTER OFF

S302 EQ TYPE III TYPE II TYPE I

S303 BIAS HIGH (III) MED (II/III) LOW

【HEADPHONE AMP CIRCUIT BOARD】

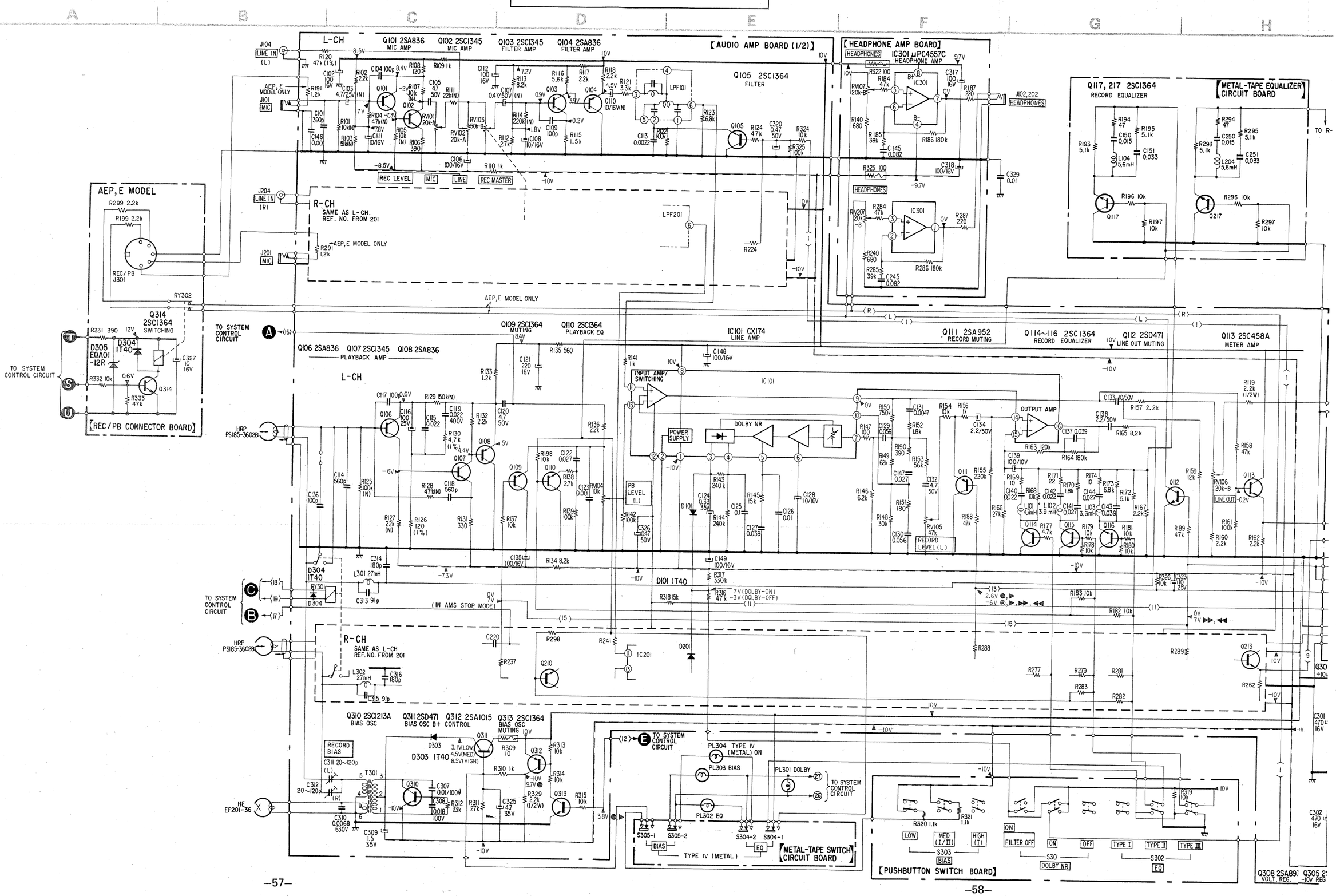
J102,202 HEADPHONES — RV107,207 HEADPHONES

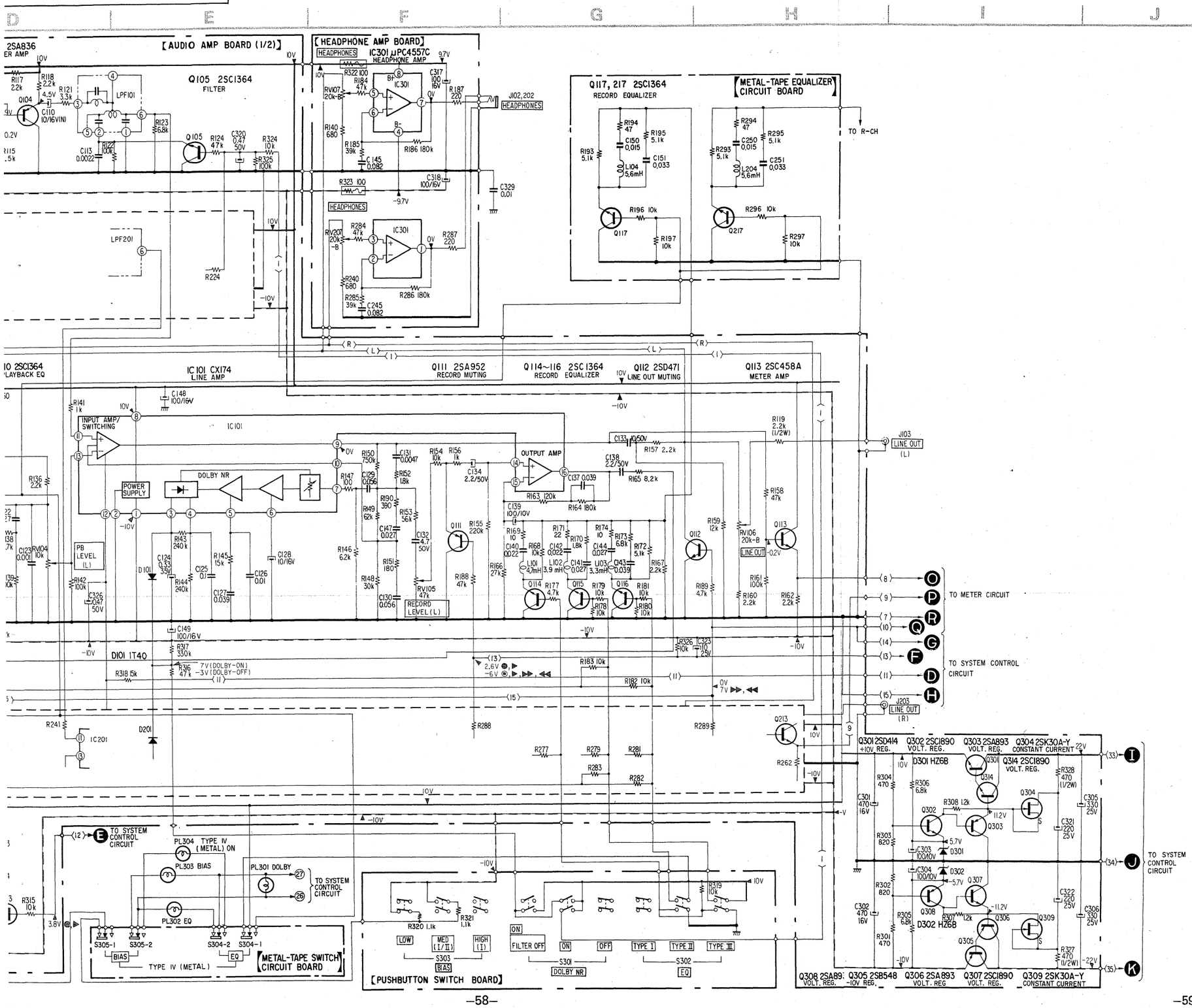
PL304 TYPE IV (METAL)

【METAL-TAPE SWITCH CIRCUIT BOARD】

BIAS S305 EQ S304 TYPE IV (METAL)

【METAL-TAPE EQUALIZER CIRCUIT BOARD】


L-CH
R-CH
SAME AS L-CH. REF. NO. FROM 201
【AUDIO AMP BOARD (1/2)】
【HEADPHONE AMP BOARD】
IC301 μPC4557C HEADPHONE AMP
Q105 2SC1364 FILTER
Q101 2SA836 MIC AMP
Q102 2SC1345 MIC AMP
Q103 2SC1345 FILTER AMP
Q104 2SA836 FILTER AMP
REC LEVEL
MIC
LINE
REC MASTER
AEP,E MODEL
AEP,E MODEL ONLY
REC/PB J301
【REC/PB CONNECTOR BOARD】
RY302
Q314 2SC1364 SWITCHING
TO SYSTEM CONTROL CIRCUIT
Q106 2SA836 Q107 2SC1345 Q108 2SA836
PLAYBACK AMP
Q109 2SC1364 MUTING
Q110 2SC1364 PLAYBACK EQ
IC101 CX174 LINE AMP
Q111 2SA952 RECORD MUTING
Q114~116 2SC1364 RECORD EQUALIZER
Q112 2SD471 LINE OUT MUTING
Q113 2SC458A METER AMP
Q117, 217 2SC1364 RECORD EQUALIZER
【METAL-TAPE EQUALIZER CIRCUIT BOARD】
TO R-
INPUT AMP/ SWITCHING
POWER SUPPLY
DOLBY NR
OUTPUT AMP
RECORD LEVEL (L)
PB LEVEL (L)
HRP PS185-36028
HE EF201-36
D304 IT40
L301 27mH
C313 91p
L302 27mH
C315 9p
C316 180p
C314 180p
T301
RECORD BIAS
C311 20~120p (L)
C312 20~120p (R)
C310 0.0068 630V
C309 15 35V
Q310 2SC1213A BIAS OSC
Q311 2SD471 Q312 2SA1015 Q313 2SC1364
BIAS OSC B+ CONTROL
BIAS OSC MUTING
D303 IT40
3.1V(LOW) 4.5V(MED) 8.5V(HIGH)
D101 IT40
D201
IC201
Q210
7V (DOLBY-ON) -3V (DOLBY-OFF)
(IN AMS STOP MODE)
PL304 TYPE IV (METAL) ON
PL303 BIAS
PL301 DOLBY
PL302 EQ
S305-1
S305-2
S304-2
S304-1
BIAS
EQ
TYPE IV (METAL)
【METAL-TAPE SWITCH CIRCUIT BOARD】
【PUSHBUTTON SWITCH BOARD】
S303 BIAS
S301 DOLBY NR
S302 EQ
LOW
MED (I/II)
HIGH (I)
FILTER OFF
TYPE I
TYPE II
TYPE III
Q308 2SA89: VOLT. REG.
Q305 2: -10V REG.



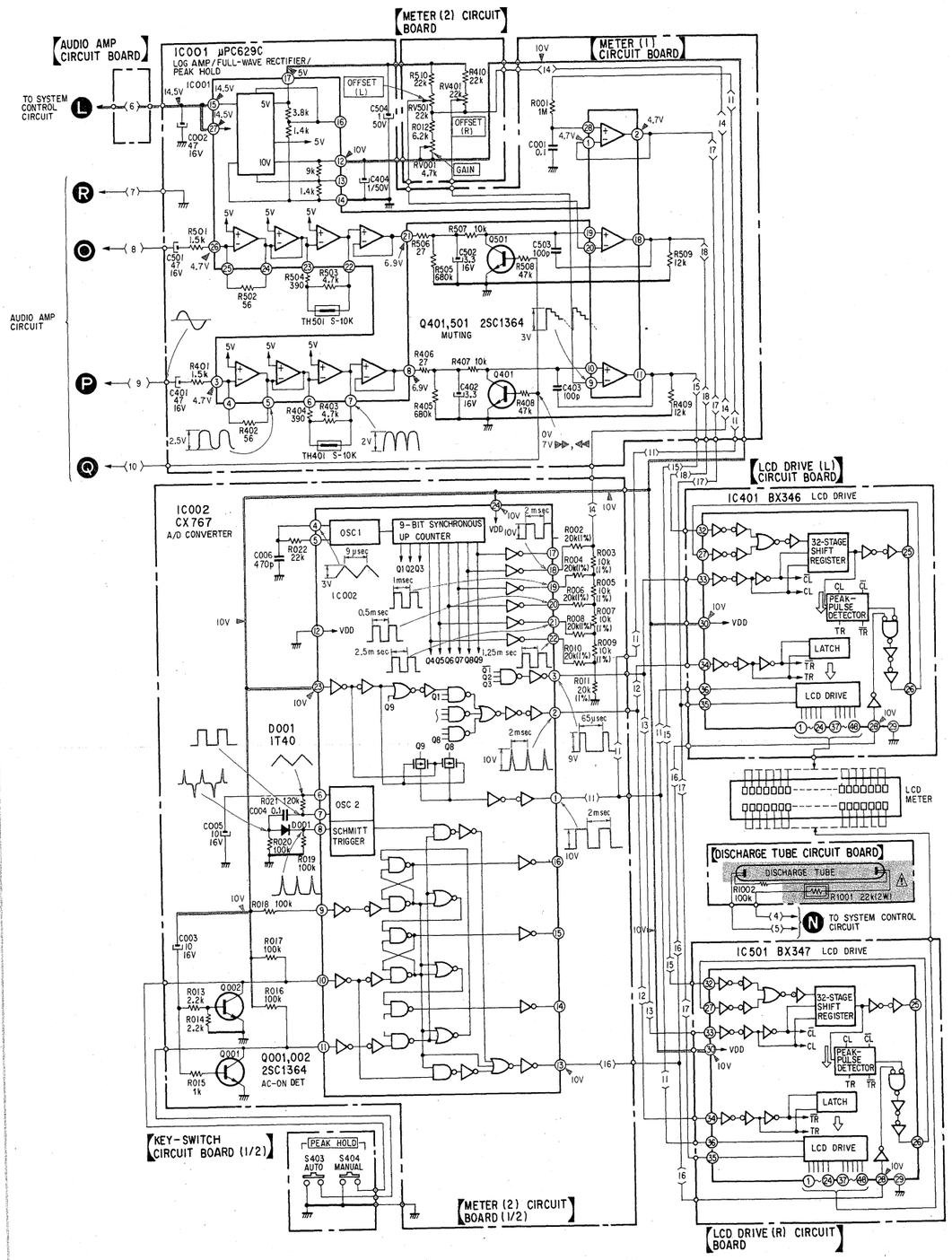
Note:

- 1% indicates component tolerance.
- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- : fusible resistor.
- : panel designation.
- : adjustment for repair.
- ——— : B+ bus.
- — — — : B— bus.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  - ◀◀ : rewind
  - ▶ : playback
  - ▶▶ : fast forward
  - ● : record
  - ▮▮ : pause
  - ⊛ : REC MUTE
  - ■ : stop

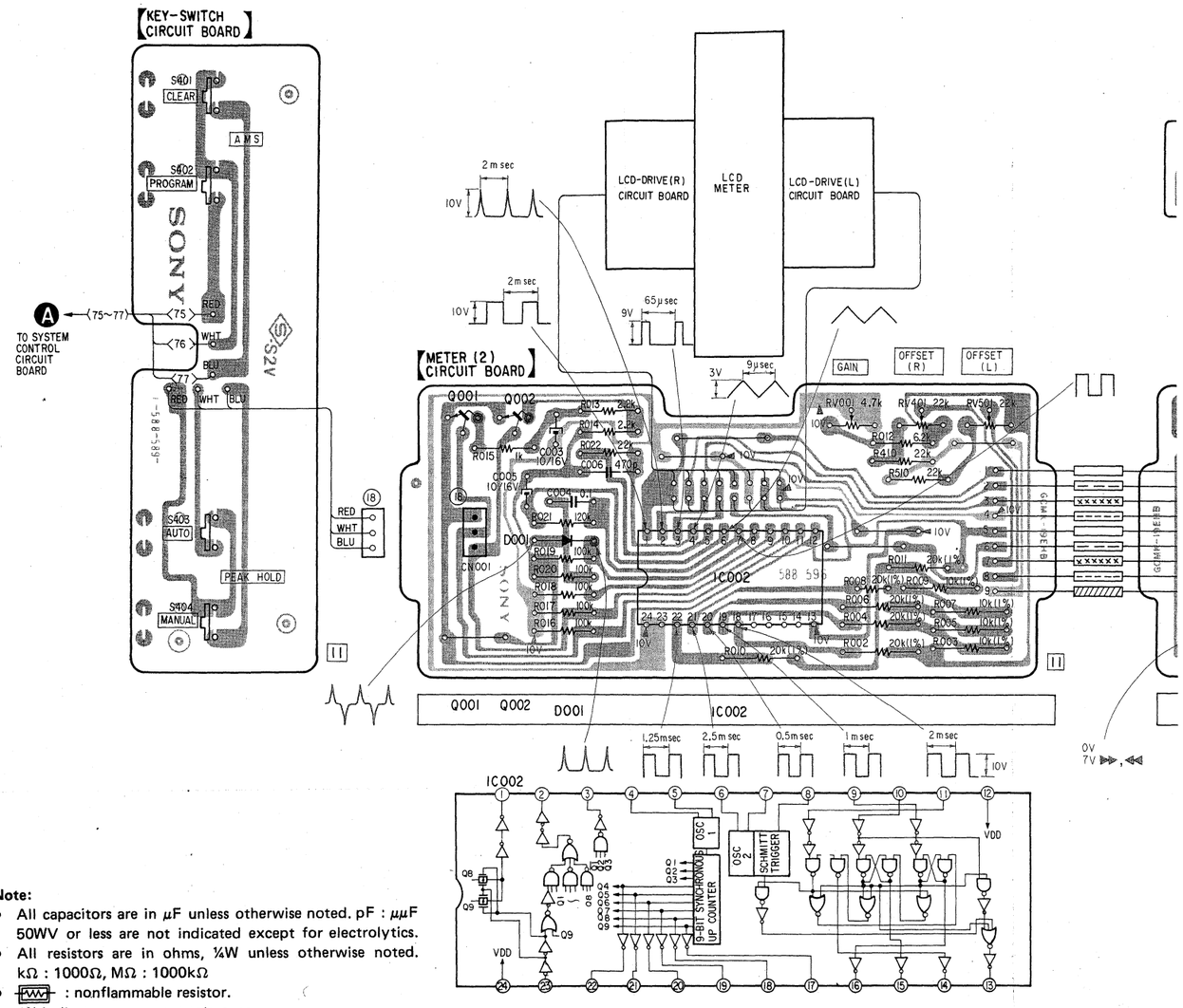
  no mark: stop
- Switch

Ref. No.	Switch	Position
S301	DOLBY NR	OFF
S302	EQ	TYPE I
S303	BIAS	LOW
S304	EQ (TYPE IV)	
S305	BIAS (TYPE IV)	

4-5. SCHEMATIC DIAGRAM — Meter Section —



4-6. MOUNTING DIAGRAM — Meter Section —



Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- 1% indicates component tolerance.
- : panel designation.
- : adjustment for repair.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  no mark: stop
  ◀◀ : rewind
  ▶▶ : fast forward
- Waveforms are taken in record mode with a 0.25V (–10dB) of 333Hz signal at LINE IN and a 0.44V (–5dB) output level at LINE OUT.
- Switch

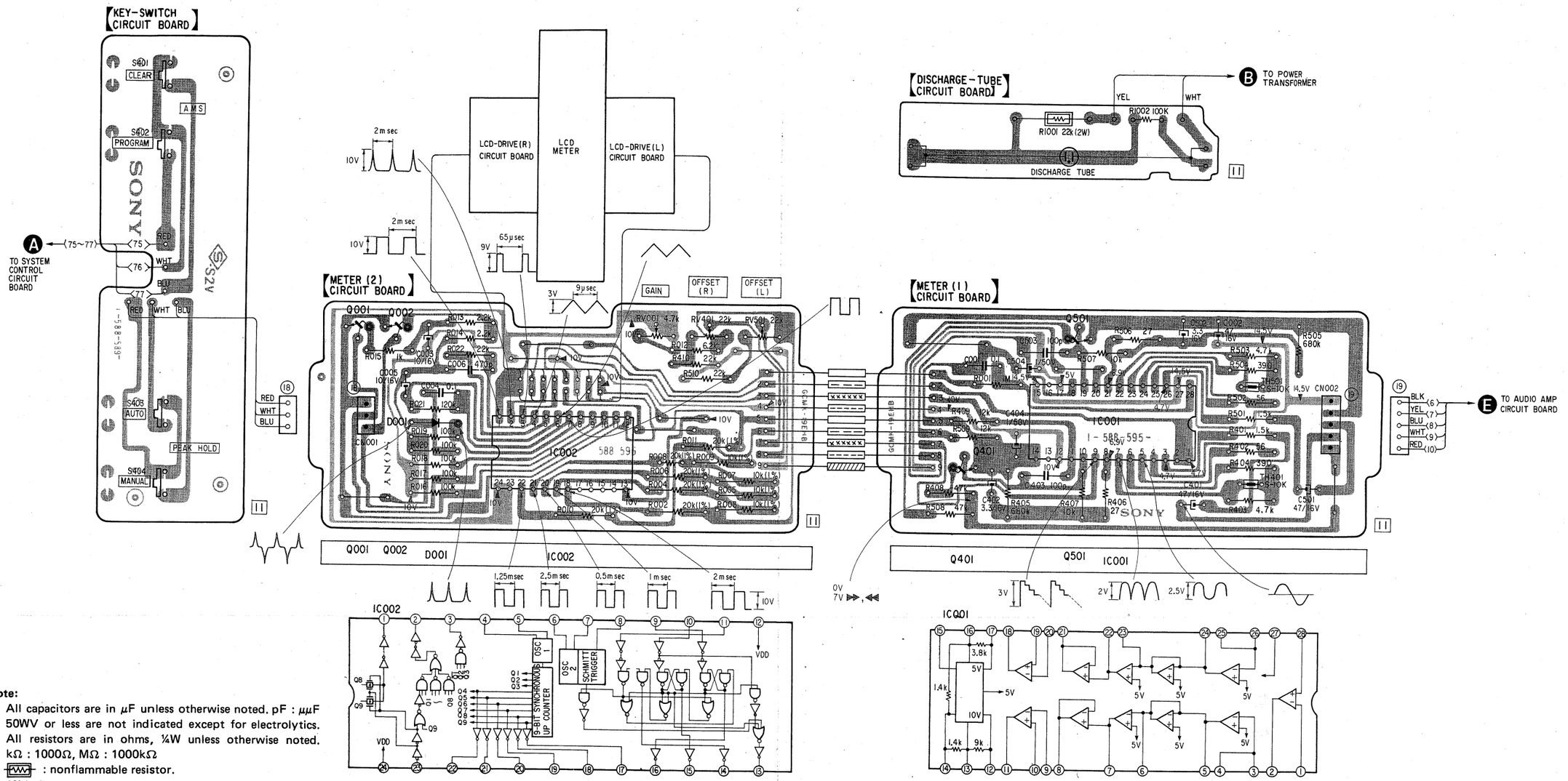
Ref. No.	Switch	Position
S403	AUTO	OFF
S404	MANUAL	OFF

- : B+ pattern

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

4-6. MOUNTING DIAGRAM — Meter Section —



Note:

- All capacitors are in μF unless otherwise noted. pF : μμF 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ
- : nonflammable resistor.
- 1% indicates component tolerance.
- : panel designation.
- : adjustment for repair.
- Readings are taken under no-signal conditions with a VOM (20kΩ/V).
  no mark: stop
  ◀◀ : rewind
  ▶▶ : fast forward
- Waveforms are taken in record mode with a 0.25V (−10dB) of 333Hz signal at LINE IN and a 0.44V (−5dB) output level at LINE OUT.
- Switch

Ref. No.	Switch	Position
S403	AUTO	OFF
S404	MANUAL	OFF

- : B+ pattern

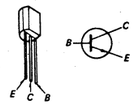
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

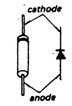
Replacement Semiconductors

For replacement, use semiconductors except in ( ).

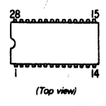
Q001, 002, Q401, 501: 2SC1364



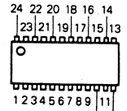
D001: 1S1555 (1T40)



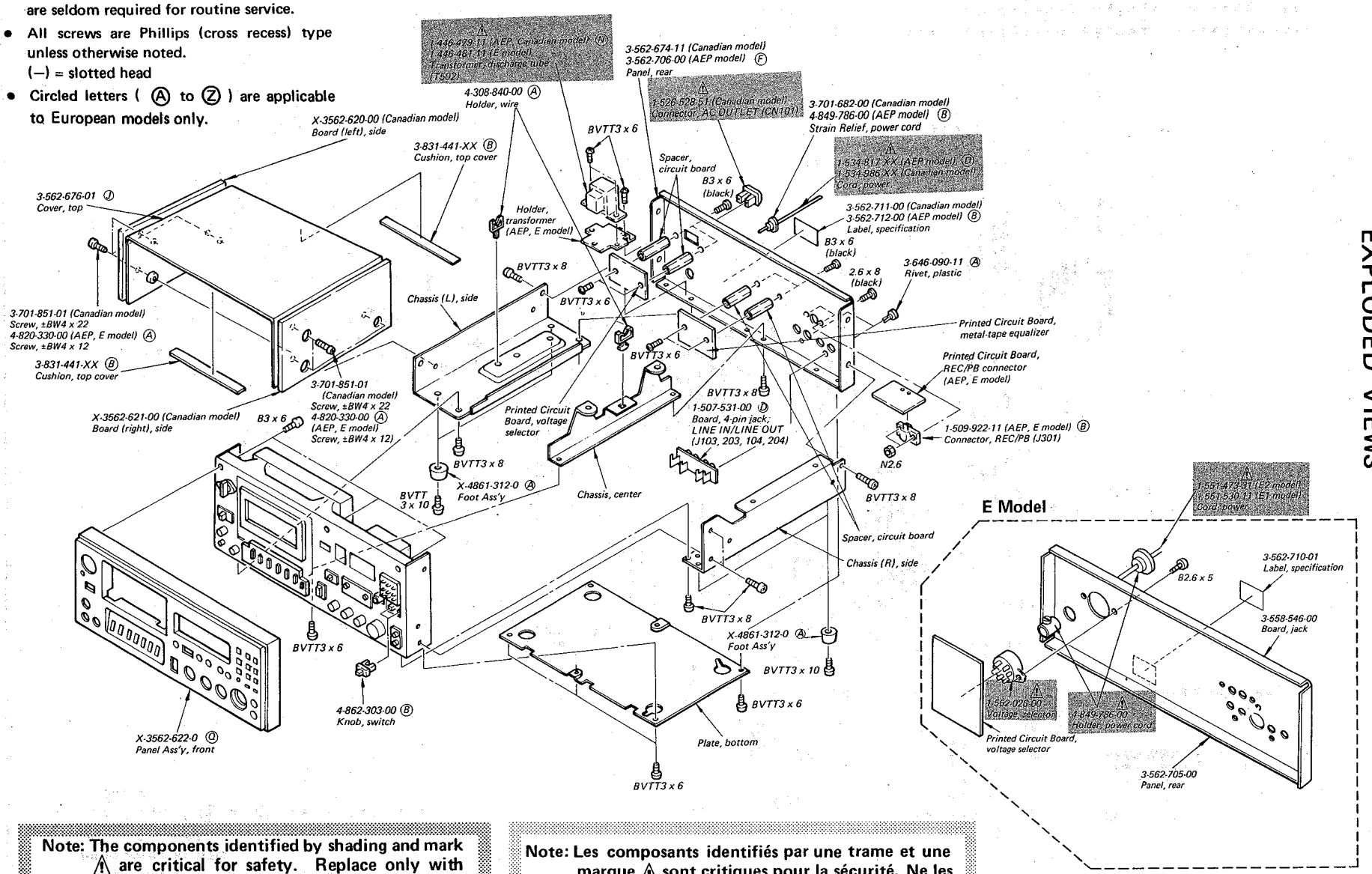
IC001: μPC629C



IC002: CX767



- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (—) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.



Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

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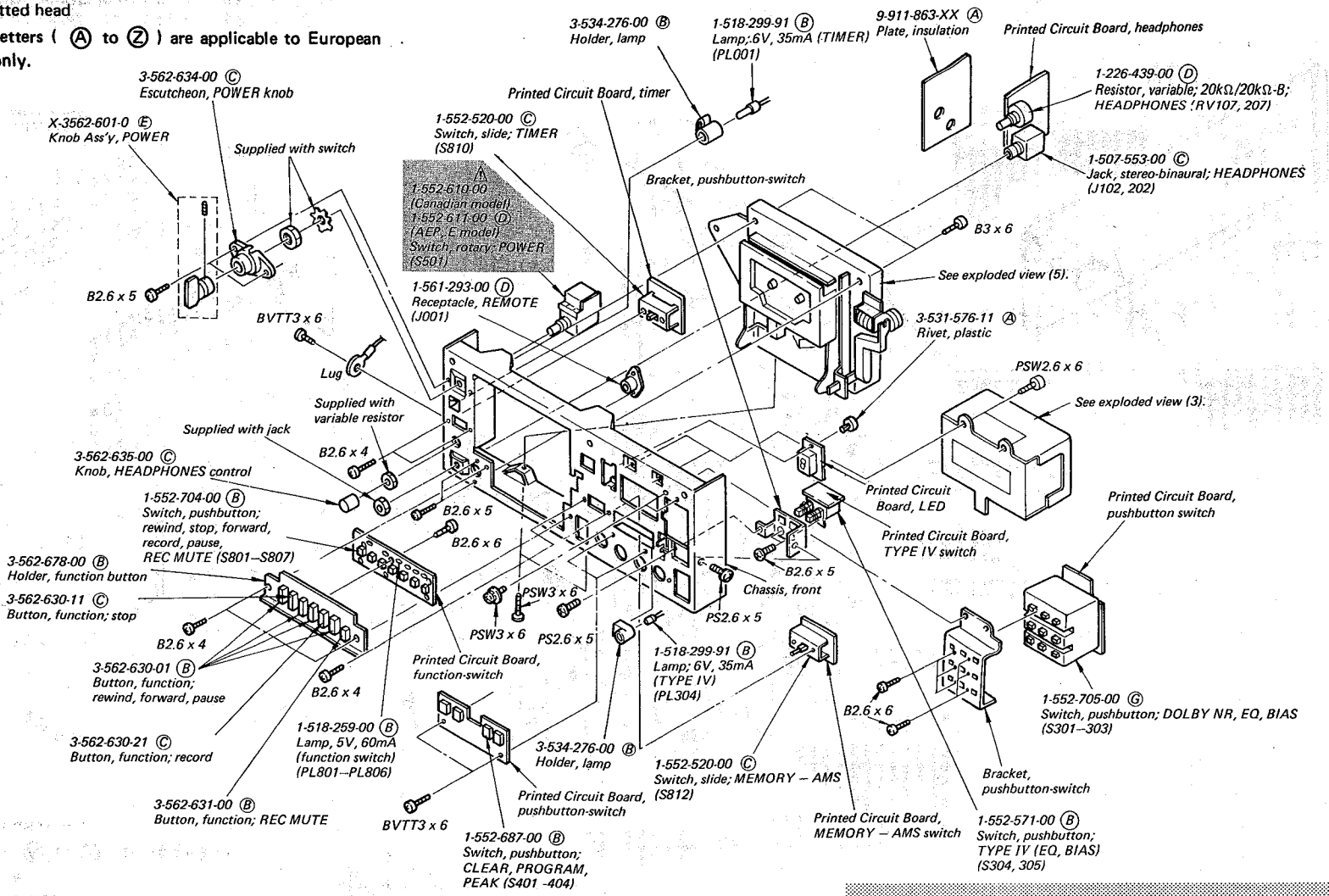

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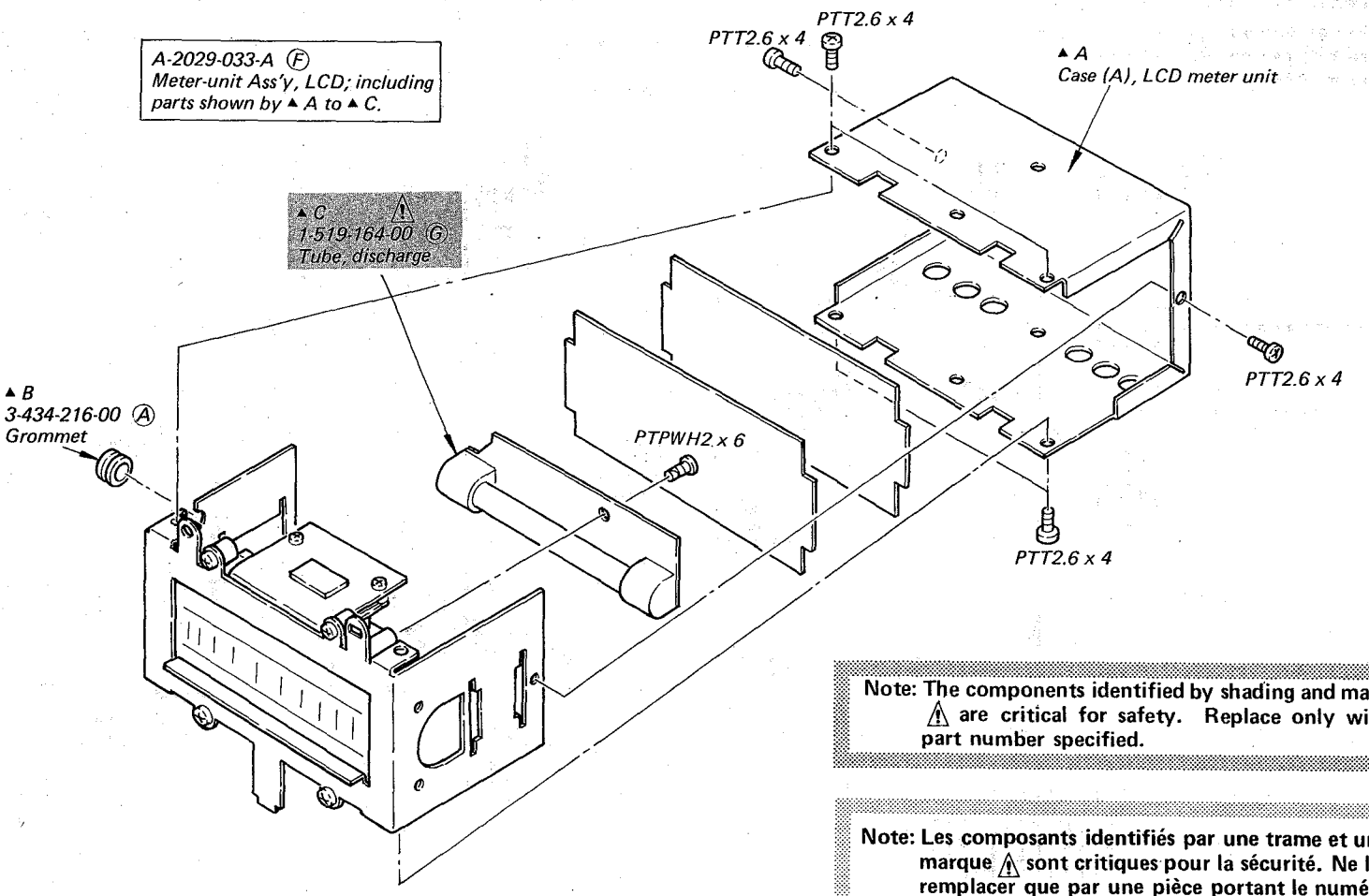

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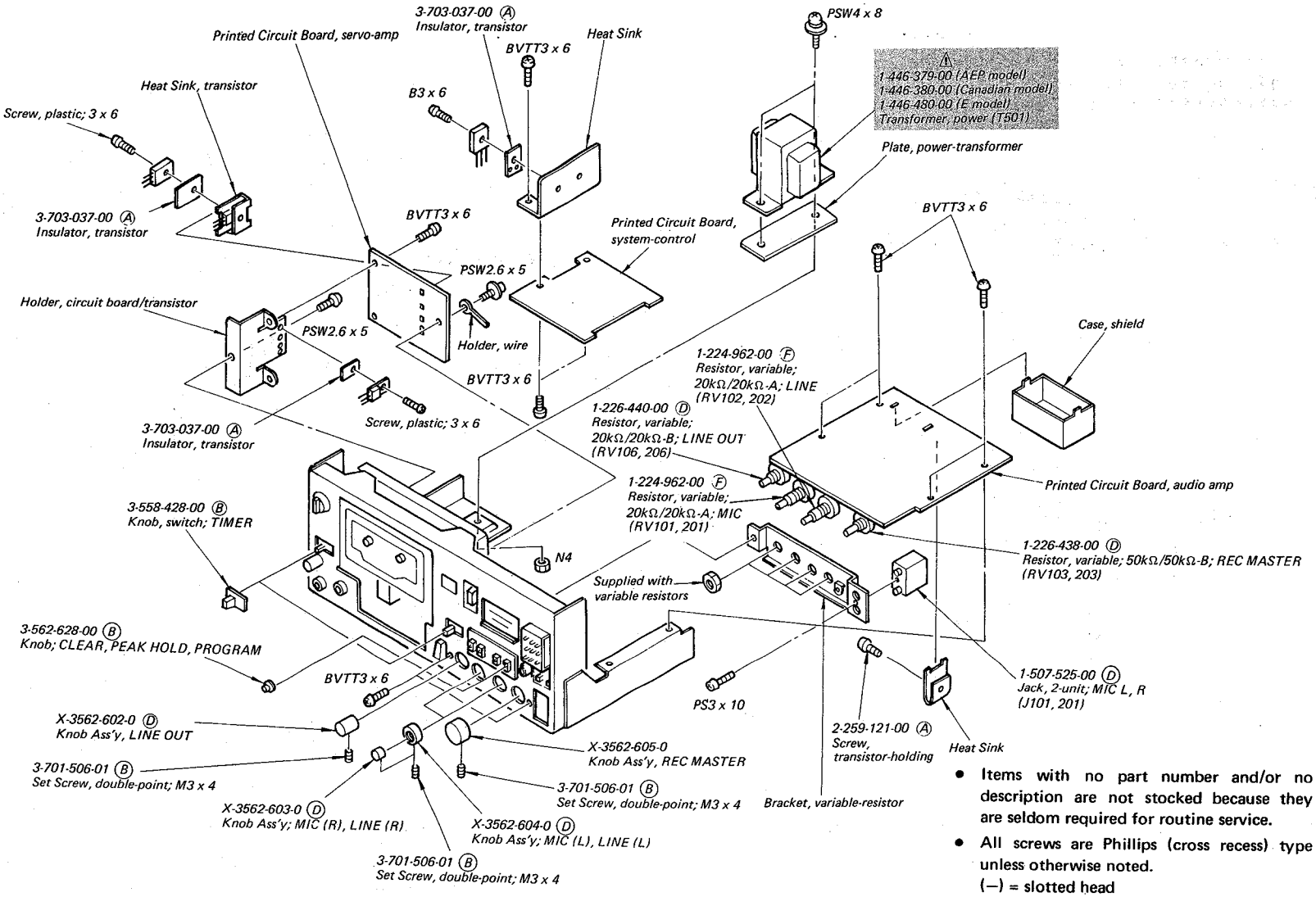

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- (□□T) shows the number of coils in spring.
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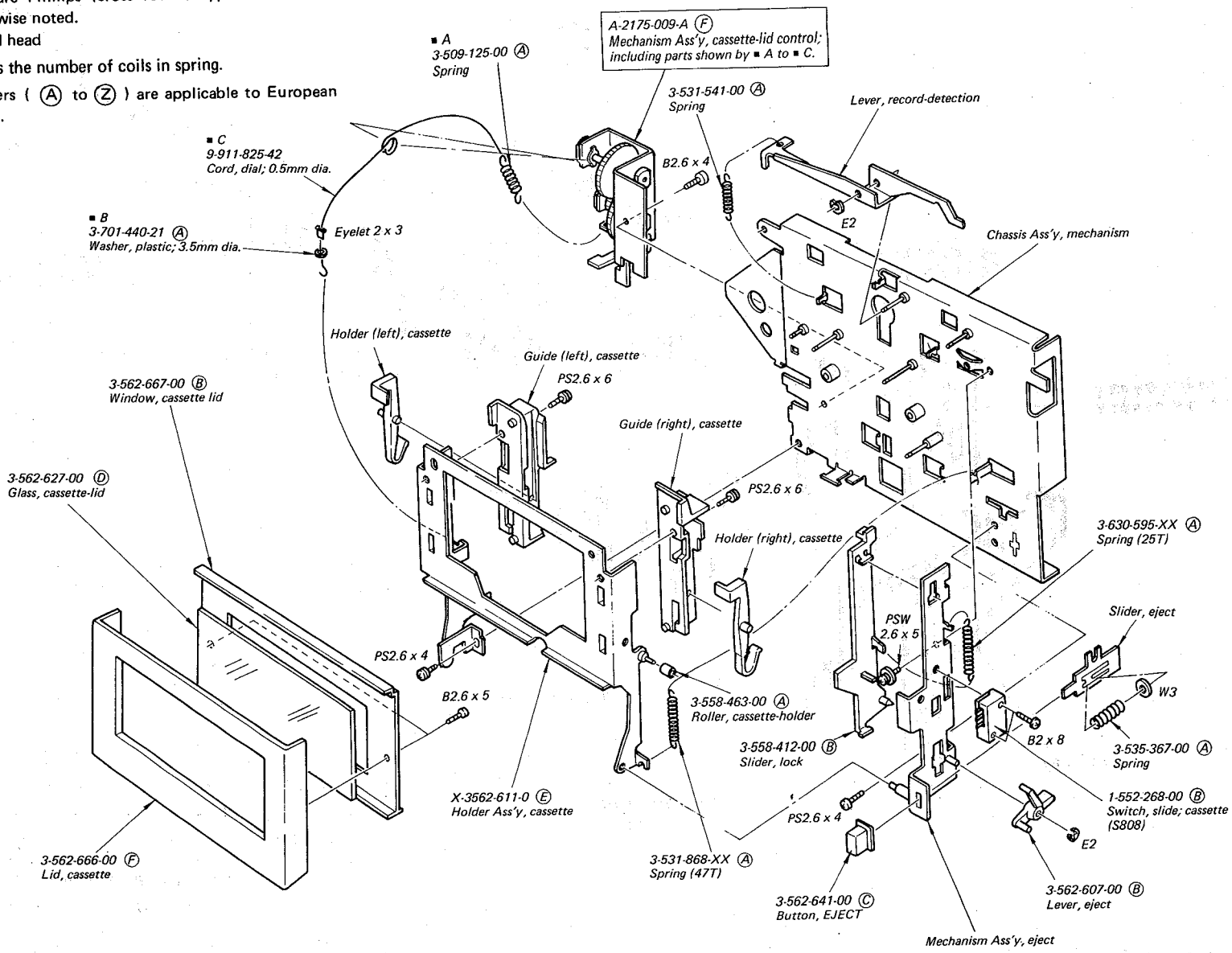

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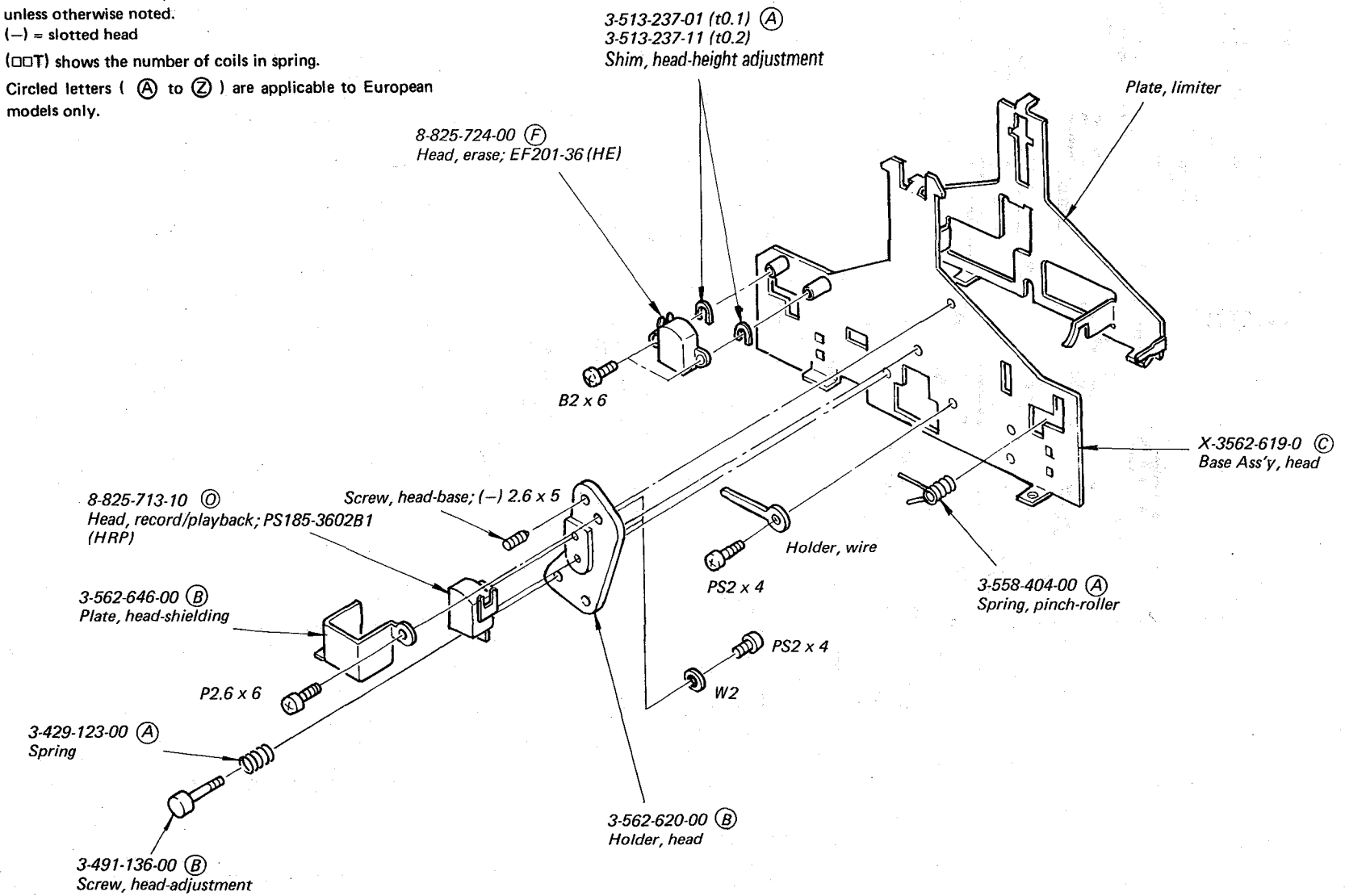

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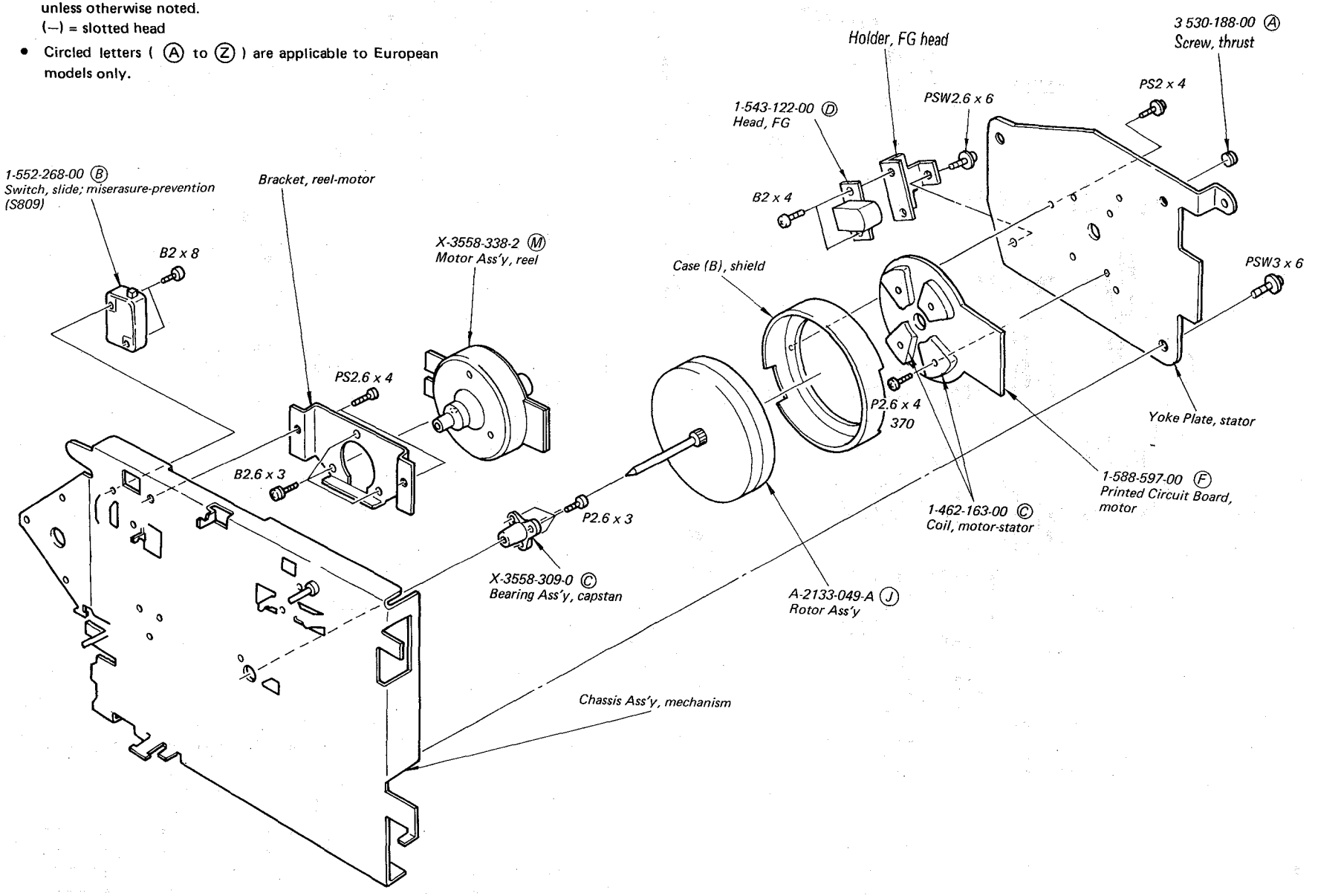

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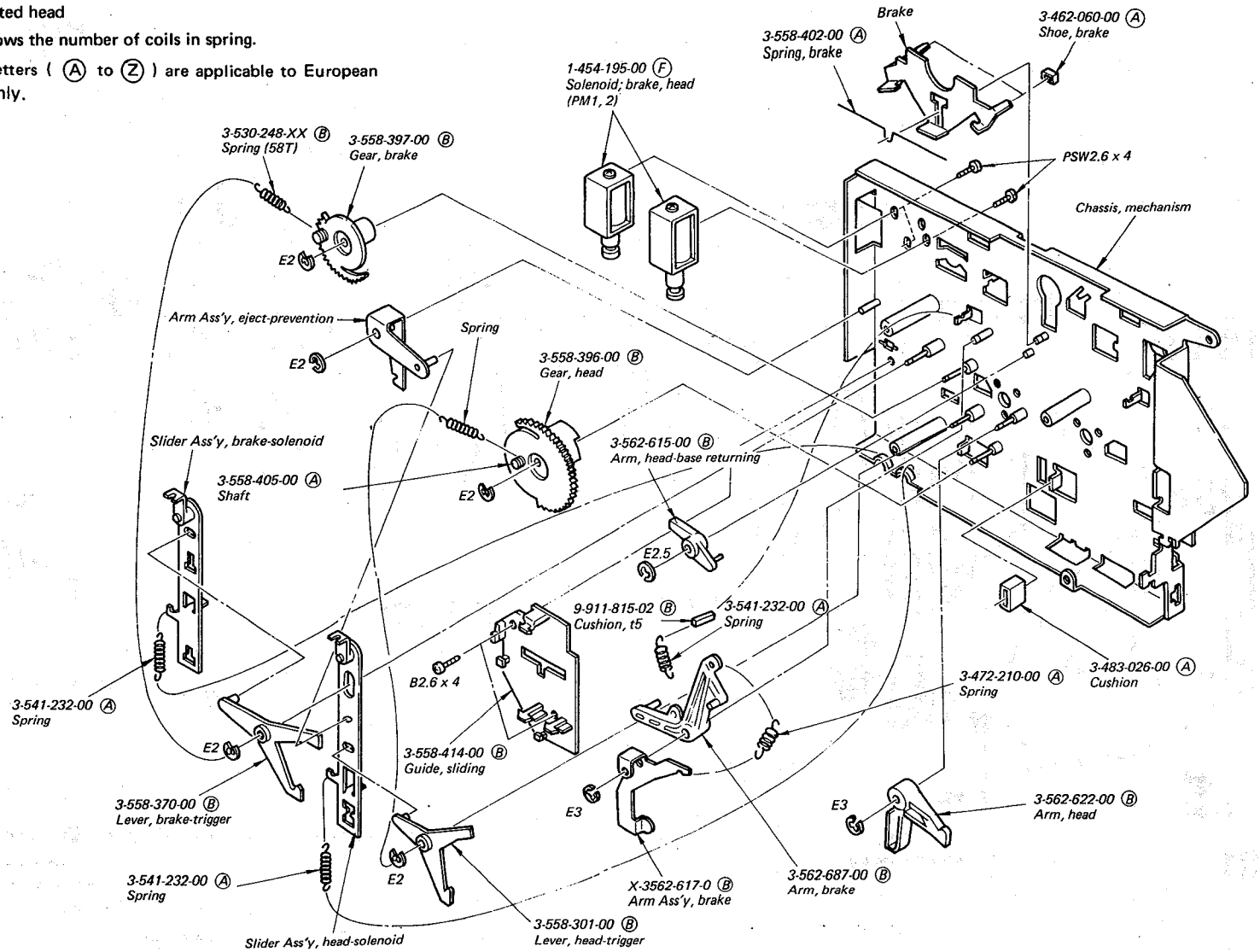

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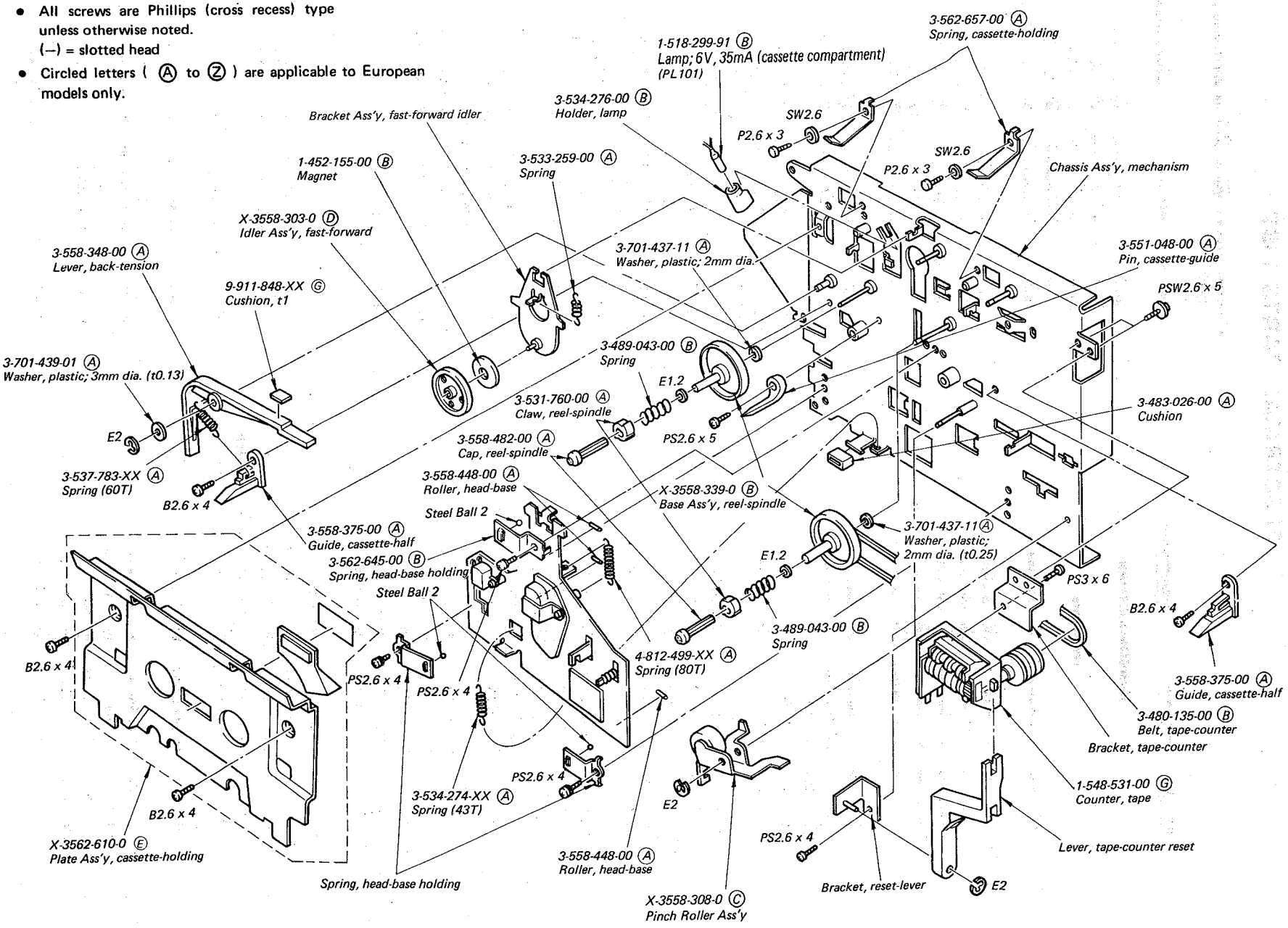

SECTION 6
ELECTRICAL PARTS LIST

- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	Part No.	Description
		SEMICONDUCTORS
		Transistors
Q001, 002	8-729-663-47	Ⓑ 2SC1364
⇒ Q101, 201	8-729-612-77	Ⓑ 2SA1027R
⇒ Q102, 202	8-729-665-47	Ⓑ 2SC1362
⇒ Q103, 203	8-729-665-47	Ⓑ 2SC1362
⇒ Q104, 204	8-729-612-77	Ⓑ 2SA1027R
Q105, 205	8-729-663-47	Ⓑ 2SC1364
⇒ Q106, 206	8-729-612-77	Ⓑ 2SA1027R
⇒ Q107, 207	8-729-665-47	Ⓑ 2SC1362
⇒ Q108, 208	8-729-612-77	Ⓑ 2SA1027R
Q109, 209	8-729-663-47	Ⓑ 2SC1364
Q110, 210	8-729-663-47	Ⓑ 2SC1364
Q111, 211	8-729-195-23	Ⓑ 2SA952
⇒ Q112, 212	8-760-335-10	Ⓑ 2SC1474
⇒ Q113, 213	8-729-663-47	Ⓑ 2SC1364
Q114–117, Q214–217	8-729-663-47	Ⓑ 2SC1364
Q301	8-729-141-43	Ⓑ 2SD414
⇒ Q302	8-720-950-03	Ⓒ 2SC926A
⇒ Q303	8-729-612-77	Ⓑ 2SA1027R
⇒ Q304	8-729-203-04	Ⓑ 2SK30A
Q305	8-729-154-83	Ⓒ 2SB548
⇒ Q306	8-729-612-77	Ⓑ 2SA1027R
⇒ Q307	8-720-950-03	Ⓓ 2SC926A
⇒ Q308	8-729-612-77	Ⓑ 2SA1027R
⇒ Q309	8-729-203-04	Ⓑ 2SK30A
⇒ Q310	8-760-413-10	Ⓑ 2SC1475
⇒ Q311	8-760-335-10	Ⓑ 2SC1474
⇒ Q312	8-729-612-77	Ⓑ 2SA1027R
Q313	8-729-663-47	Ⓑ 2SC1364
Q314	8-720-950-03	2SC926A (Canadian model)
Q314	8-729-663-47	Ⓑ 2SC1364 (AEP, E model)
Q401, 501	8-729-663-47	Ⓑ 2SC1364
⇒ Q601, 602	8-729-663-47	Ⓑ 2SC1364
⇒ Q603, 604	8-729-612-77	Ⓑ 2SA1027R
⇒ Q605, 606	8-729-663-47	Ⓑ 2SC1364
⇒ Q608, 609	8-729-663-47	Ⓑ 2SC1364
Q611	8-729-217-33	Ⓒ 2SC1173
Q612	8-729-247-33	Ⓒ 2SA473
Q613	8-729-217-33	Ⓒ 2SC1173
Q614	8-729-247-33	Ⓒ 2SA473
⇒ Q615	8-729-663-47	Ⓑ 2SC1364
⇒ Q616	8-729-612-77	Ⓑ 2SA1027R
⇒ Q617–621	8-729-663-47	Ⓑ 2SC1364
⇒ Q622	8-729-612-77	Ⓑ 2SA1027R
⇒ Q623, 624	8-729-663-47	Ⓑ 2SC1364
Q625	8-729-141-43	Ⓑ 2SD414
Q626	8-729-154-83	Ⓒ 2SB548
Q627	8-729-141-43	Ⓑ 2SD414
Q628	8-729-154-83	Ⓒ 2SB548
⇒ Q801	8-760-335-10	Ⓑ 2SC1474
⇒ Q802	8-729-468-43	Ⓒ 2SA684
⇒ Q803	8-760-335-10	Ⓑ 2SC1474
Q804	8-729-141-43	Ⓑ 2SD414
Q805	8-729-663-47	Ⓑ 2SC1364
Q806	8-729-154-83	Ⓒ 2SB548
⇒ Q808, 809	8-729-612-77	Ⓑ 2SA1027R
Q811, 812	8-729-663-47	Ⓑ 2SC1364
⇒ Q813	8-729-468-43	Ⓒ 2SA684
Q814	8-729-663-47	Ⓑ 2SC1364
⇒ Q815	8-760-335-10	Ⓑ 2SC1474
Q816	8-729-663-47	Ⓑ 2SC1364
⇒ Q817	8-760-335-10	Ⓑ 2SC1474
⇒ Q818	8-729-612-77	Ⓑ 2SA1027R
Q819–826	8-729-663-47	Ⓑ 2SC1364
Q827	8-729-101-31	Ⓑ N13T1
		ICs
IC001	8-759-162-90	Ⓚ μPC629C
IC002	8-759-907-67	Ⓘ CX767
IC101, 201	8-759-101-74	Ⓗ CX174
IC301	8-759-145-57	Ⓓ μPC4557C
IC401	8-743-460-00	Ⓞ BX346
IC501	8-743-470-00	Ⓞ BX347
IC601	8-751-930-00	Ⓚ CX193

- ⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

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Ref. No.	Part No.		Description
IC602 IC604, 605	8-759-145-58	Ⓓ	μPC4558C
IC801	8-759-147-27	Ⓛ	μPD547-027
IC802	8-759-959-53	Ⓙ	MSM5953
IC803	8-759-133-90	Ⓖ	μPC339C
IC804	8-759-145-58	Ⓓ	μPC4558C
IC805, 806	8-759-904-69	Ⓒ	MSM4069
IC807	8-759-145-58	Ⓓ	μPC4558C
	Diodes		
⇒ D001	8-719-815-55	Ⓑ	1S1555
⇒ D101, 201	8-719-815-55	Ⓑ	1S1555
⇒ D301, 302	8-719-910-65	Ⓑ	HZ6B2L
⇒ D303, 304 ⇒ D601, 602 ⇒ D605	8-719-815-55	Ⓑ	1S1555
D801–810	⚠ 8-719-200-02	Ⓑ	10E2
⇒ D811–822	8-719-815-55	Ⓑ	1S1555
D823	8-719-200-02	Ⓑ	10E2
⇒ D824–833	8-719-815-55	Ⓑ	1S1555
D834	8-719-305-10	Ⓔ	SEL510
⇒ D835	8-719-815-55	Ⓑ	1S1555
⇒ D836, 837	8-719-931-15	Ⓑ	EQB01-15
	Thermistors		
Th401,501	1-800-202-XX	Ⓑ	S-10K
	COILS AND TRANSFORMERS		
L101, 201	1-407-202-XX	Ⓑ	4.7mH, microinductor
L102, 202	1-407-201-XX	Ⓑ	3.9mH, microinductor
L103, 203	1-407-200-XX	Ⓑ	3.3mH, microinductor
L104, 204	1-407-203-XX	Ⓑ	5.6mH, microinductor
L301, 302	1-407-878-00	Ⓑ	27mH, microinductor
L801	1-405-800-11	Ⓑ	Coil, clock osc
T301	1-433-132-11	Ⓒ	Bias Osc
T501	⚠ 1-446-379-00	Ⓝ	Transformer, power (AEP model)
	⚠ 1-446-380-00		Transformer, power (Canadian model)
	⚠ 1-446-480-00		Transformer, power (E model)
T502	⚠ 1-446-479-11	Ⓝ	Transformer, discharge-tube (AEP model)
	⚠ 1-446-481-11		Transformer, discharge-tube (E model)

CAPACITORS

All capacitors are in μF and ceramic unless otherwise noted.
50WV or less are not indicated except for electrolytics.
p : μμF, elect : electrolytic

C001	1-108-603-00	Ⓑ	0.1		mylar
C002	1-123-319-00	Ⓑ	47	16V	elect
C003	1-123-316-00	Ⓑ	10	16V	elect
C004	1-108-603-00	Ⓑ	0.1		mylar
C005	1-123-316-00	Ⓑ	10	16V	elect
C006	1-161-319-00	Ⓐ	470p		
C101, 201	1-161-318-00	Ⓐ	390p		
C102, 202	1-123-320-00	Ⓑ	100	16V	elect
C103, 203	1-121-915-00	Ⓑ	4.7	25V	elect (low noise)
C104, 204	1-161-271-00	Ⓐ	100p		
C105, 205	1-123-232-00	Ⓑ	4.7	50V	elect (nonpolarized)
C106, 206	1-123-320-00	Ⓑ	100	16V	elect
C107, 207	1-121-911-00	Ⓑ	0.47	50V	elect (low noise)
C108, 208	1-123-316-00	Ⓑ	10	16V	elect
C109, 209	1-161-271-00	Ⓐ	100p		
C110, 210	1-121-916-00	Ⓑ	10	16V	elect (low noise)
C111, 211	1-123-316-00	Ⓑ	10	16V	elect
C112, 212	1-123-320-00	Ⓑ	100	16V	elect
C113, 213	1-108-563-00	Ⓑ	0.0022		mylar
C114, 214	1-161-320-00	Ⓐ	560p		
C115, 215	1-101-005-00	Ⓐ	0.022		
C116, 216	1-121-911-00	Ⓑ	100	25V	elect
C117, 217	1-161-271-00	Ⓐ	100p		
C118, 218	1-161-320-00	Ⓐ	560p		
C119, 219	1-129-776-00	Ⓑ	0.022	100V	polypropylene
C120, 220	1-123-232-00	Ⓑ	4.7	50V	elect (nonpolarized)
C121, 221	1-123-321-00	Ⓑ	220	16V	elect
C122, 222	1-108-589-00	Ⓑ	0.027		mylar
C123, 223	1-102-074-00	Ⓐ	0.001		
C124, 224	1-131-212-00		0.33	35V	tantalum
C125, 225	1-108-603-00	Ⓑ	0.1		mylar

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	Part No.	Description		
C126, 226	1-108-579-00	Ⓑ 0.01		mylar
C127, 227	1-108-593-00	Ⓑ 0.039		mylar
C128, 228	1-123-316-00	Ⓑ 10	16V	elect
C129, 229, C130, 230	1-108-597-00	Ⓑ 0.056		mylar
C131, 231	1-108-571-00	Ⓑ 0.0047		mylar
C132, 232	1-123-232-00	Ⓑ 4.7	50V	elect (nonpolarized)
C133, 233	1-123-234-00	Ⓑ 10	50V	elect (nonpolarized)
C134, 234	1-123-230-00	Ⓑ 2.2	50V	elect (nonpolarized)
C135, 235	1-123-320-00	Ⓑ 100	16V	elect
C136, 236		Ⓐ 100p		
C137, 237	1-108-593-00	Ⓑ 0.039		mylar
C138, 238	1-123-230-00	Ⓑ 2.2	50V	elect (nonpolarized)
C139, 239	1-121-414-00	Ⓑ 100	10V	elect
C140, 240	1-108-587-00	Ⓑ 0.022		mylar
C141, 241	1-108-589-00	Ⓑ 0.027		mylar
C142, 242	1-108-587-00	Ⓑ 0.022		mylar
C143, 243	1-108-593-00	Ⓑ 0.039		mylar
C144, 244	1-108-589-00	Ⓑ 0.027		mylar
C145, 245	1-108-362-00	Ⓑ 0.082		mylar
C146, 246	1-161-323-00	Ⓐ 0.001		
C147, 247	1-108-589-00	Ⓑ 0.027		mylar
C148, 248, C149, 249	1-123-320-00	Ⓑ 100	16V	elect
C150, 250	1-108-583-00	Ⓑ 0.015		mylar
C151, 251	1-108-591-00	Ⓑ 0.033		mylar
C301, 302	1-123-323-00	Ⓑ 470	16V	elect
C303, 304	1-123-307-00	Ⓑ 100	10V	elect
C305, 306	1-123-335-00	Ⓑ 330	25V	elect
C307	1-129-701-00	Ⓑ 0.01	100V	polyprophyrene
C308	1-130-189-00	Ⓑ 0.018	100V	polyprophyrene
C309	1-131-216-00	1.5	35V	solid-tantalum
C310	1-129-712-00	Ⓑ 0.0068	630V	plastic
C311, 312	1-141-215-00	Ⓑ Trimmer		
C313, 315	1-107-168-00	Ⓑ 91p	500V	silvered-mica
C314, 316	1-107-137-00	Ⓑ 180p		silvered-mica
C317, 318	1-121-415-00	Ⓑ 100	16V	elect
C320	1-123-351-00	Ⓑ 0.47	50V	elect
C321, 322	1-123-334-00	Ⓑ 220	25V	elect
C323	1-123-329-00	Ⓑ 10	25V	elect
C325	1-131-219-00	Ⓑ 4.7	35V	solid-tantalum
C326	1-123-351-00	Ⓑ 0.47	50V	elect
C327		10	10V	elect (AEP, E model)
C329	1-161-013-00	0.01		(semiconductor)
C401, 501	1-123-319-00	Ⓑ 47	16V	elect
C402, 502	1-131-197-00	Ⓑ 3.3	16V	solid-tantalum
C403, 503	1-161-271-00	Ⓐ 100p		
C404, 504	1-123-352-00	Ⓑ 1	50V	elect
C601	1-108-589-00	Ⓑ 0.01		mylar
C602	1-123-351-00	Ⓑ 0.47	50V	elect
C603–605	1-123-316-00	Ⓑ 10	16V	elect
C606	1-130-188-00	Ⓑ 0.01	100V	composite-plastic
C607	1-108-579-00	Ⓑ 0.01		mylar
C608	1-108-589-00	Ⓑ 0.027		mylar
C609	1-108-573-00	Ⓑ 0.0056		mylar
C610, 611	1-108-579-00	Ⓑ 0.01		mylar
C612, 613	1-102-903-00	Ⓑ 130p		
C614	1-102-491-00	Ⓐ 51p		
C615	1-131-211-00	Ⓑ 0.22	35V	solid-tantalum
C616	1-108-597-00	Ⓑ 0.056		mylar
C617	1-123-295-00	Ⓑ 100	6.3V	elect
C618	1-108-595-00	Ⓑ 0.01		mylar
C619–621	1-108-579-00	Ⓑ 0.01		mylar
C622	1-123-232-00	Ⓑ 4.7	50V	elect (nonpolarized)
C623, 624	1-123-320-00	Ⓑ 100	16V	elect
C625	1-108-609-00	Ⓑ 0.18		mylar
C626	1-123-232-00	Ⓑ 4.7	50V	elect (nonpolarized)
C627	1-108-609-00	Ⓑ 0.18		mylar
C628	1-123-232-00	Ⓑ 4.7	50V	elect (nonpolarized)
C629, 630	1-108-595-00	Ⓑ 0.047		mylar
C631, 632	1-123-228-00	Ⓑ 1	50V	elect (nonpolarized)

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Ref. No.	Part No.		Description
RV103, 203	1-226-438-00	Ⓓ	50kΩ/50kΩ-B, variable; REC MASTER
RV104, 204	1-224-252-XX	Ⓑ	10kΩ-B, adjustable; playback level
RV105, 205	1-224-254-XX	Ⓑ	47kΩ-B, adjustable; record level
RV106, 206	1-226-440-00	Ⓕ	20kΩ/20kΩ-B, variable; LINE OUT
RV107, 207	1-226-439-00	Ⓓ	20kΩ/20kΩ-B, variable; HEADPHONES
RV401, 501	1-224-646-XX	Ⓑ	22kΩ-B, adjustable; offset
RV601	1-224-491-00	Ⓑ	22kΩ-B, adjustable; tape speed
RV602, 603	1-224-643-XX	Ⓑ	2.2kΩ-B, adjustable; capstan-motor gain
RV604, 605	1-224-645-XX	Ⓑ	10kΩ-B, adjustable; capstan-motor offset
RV606	1-224-642-XX	Ⓑ	1kΩ-B, adjustable; reel-motor torque
RV607	1-224-644-XX	Ⓑ	4.7kΩ-B, adjustable; reel-motor gain balance
RV608, 609	1-224-644-XX	Ⓑ	4.7kΩ-B, adjustable; reel-motor offset

CONNECTORS

CN101	⚠1-526-528-51		Connector, AC OUTLET (Canadian model)
J001	1-561-293-00	Ⓓ	Receptacle, REMOTE
J101, 201	1-507-525-00	Ⓓ	Jack, 2-unit; MIC L, R
J102, 202	1-507-553-00	Ⓒ	Jack, stereo-binaural; HEADPHONES
J103, 203 J104, 204	1-507-531-00	Ⓓ	Board, 4-pin jack; LINE IN/LINE OUT
J301	1-509-922-11	Ⓑ	Connector, REC/PB (AEP, E model)

SWITCHES

S301 – 303	1-552-705-00	Ⓖ	Pushbutton, DOLBY NR, EQ, BIAS
S304, 305	1-552-571-00	Ⓑ	Pushbutton, TYPE IV (EQ, BIAS)
S401–404	1-552-687-00	Ⓑ	Pushbutton, CLEAR, PROGRAM, PEAK
S501	⚠1-552-610-00		Rotary, POWER (Canadian model)
	⚠1-552-611-00	Ⓓ	Rotary, POWER (AEP, E model)
S801–807	1-552-704-00	Ⓑ	Pushbutton, rewind, stop, forward, record, pause, REC MUTE
S808, 809	1-552-268-00	Ⓑ	Slide, miserasure-prevension, cassette
S810	1-552-520-00	Ⓒ	Slide, TIMER
S811			included in tape counter
S812	1-552-520-00	Ⓒ	Slide, MEMORY – AMS

MISCELLANEOUS

CP501	⚠1-231-341-21		Encapsulated Component (Canadian model)
HE	8-825-724-00	Ⓕ	Head, erase; EF201-36
HRP	8-825-713-10	Ⓞ	Head, record/playback; PS185-3602B1
LPF101,201	1-231-388-00	Ⓓ	Filter, low-pass
PL001	1-518-299-91	Ⓑ	Lamp, 6V, 35mA (TIMER)
PL101	1-518-299-91	Ⓑ	Lamp, 6V, 35mA (cassette compartment)
PL301–303			included in S301 – 303
PL304	1-518-299-91	Ⓑ	Lamp, 6V, 35mA (TYPE IV)
PL801–806	1-518-259-00	Ⓑ	Lamp, 5V, 60mA (function switch)
PM1, 2	1-454-195-00	Ⓕ	Solenoid; brake, head
RY301	1-515-323-00	Ⓖ	Relay
RY302	1-515-297-11	Ⓕ	Relay, reed (AEP, E model)
X601	1-527-401-11	Ⓓ	Crystal Unit
	X-3558-338-2	Ⓜ	Motor Ass'y, reel
	1-452-155-00	Ⓑ	Magnet
	1-462-163-00	Ⓒ	Coil, motor-stator
	⚠1-519-164-XX	Ⓖ	Tube, discharge
	⚠1-534-817-XX	Ⓓ	Cord, power (AEP model)
	⚠1-534-986-XX		Cord, power (Canadian model)
	1-543-122-00	Ⓓ	Head, detection
	1-548-531-00	Ⓖ	Counter, tape
	⚠1-551-473-31		Cord, power (E2 model)
	⚠1-551-530-11		Cord, power (E1 model)
	⚠1-552-026-00		Voltage Selector (E model)
	1-588-592-00	Ⓐ	Printed Circuit Board, timer
	1-588-597-00	Ⓕ	Printed Circuit Board, motor

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

• Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	Part No.		Description		
C801	⚠1-123-336-00	Ⓑ	470	25V	elect
C802, 803	⚠1-123-337-00	Ⓑ	1000	25V	elect
C804, 805	⚠1-123-324-00	Ⓑ	1000	16V	elect
C806	1-123-330-00	Ⓑ	22	25V	elect
C807	1-123-318-00	Ⓑ	33	16V	elect
C808	1-123-308-00	Ⓑ	220	10V	elect
C809	1-121-391-00	Ⓑ	1	50V	elect
C810	1-123-351-00	Ⓑ	0.47	50V	elect
C811	1-123-353-00	Ⓑ	2.2	50V	elect
C812		Ⓑ	10	10V	elect
C813, 814	1-123-316-00	Ⓑ	10	16V	elect
C815	1-121-391-00	Ⓑ	1	50V	elect
C816	1-123-353-00	Ⓑ	2.2	50V	elect
C817, 818	1-123-351-00	Ⓑ	0.47	50V	elect
C819	1-123-316-00	Ⓑ	10	16V	elect
C820	1-108-361-00	Ⓑ	0.056		mylar
C821	1-108-244-00	Ⓑ	0.033		mylar
C822		Ⓑ	10	10V	elect
C823	1-121-391-00	Ⓑ	1	50V	elect
C824	1-108-244-00	Ⓑ	0.033		mylar
C825	1-123-353-00	Ⓑ	2.2	50V	elect
C826	1-108-244-00	Ⓑ	0.033		mylar
C827	1-161-323-00	Ⓐ	0.001		
C828	1-161-330-00	Ⓐ	0.01		
C829	1-161-271-00	Ⓐ	100p		
C830	1-123-316-00	Ⓑ	10	16V	elect
C831, 832	1-123-353-00	Ⓑ	2.2	50V	elect
C833	1-123-351-00	Ⓑ	0.47	50V	elect
C834					
C835	1-161-330-00	Ⓐ	0.01		
C836	1-123-318-00	Ⓑ	33	16V	elect
C1001	1-130-267-00		0.022	250V	metallized-film (AEP, E model)
C1002	1-130-267-00		0.022	250V	metallized film (E model)

RESISTORS

All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on the last page for their part numbers.

R002	1-214-163-00	Ⓐ	20k	1%	metal oxide
R003	1-214-156-00	Ⓐ	10k	1%	metal oxide
R004	1-214-163-00	Ⓐ	20k	1%	metal oxide
R005	1-214-156-00	Ⓐ	10k	1%	metal oxide
R006	1-214-163-00	Ⓐ	20k	1%	metal oxide
R007	1-214-156-00	Ⓐ	10k	1%	metal oxide
R008	1-214-163-00	Ⓐ	20k	1%	metal oxide
R009	1-214-156-00	Ⓐ	10k	1%	metal oxide
R010, 011	1-214-163-00	Ⓐ	20k	1%	metal oxide
R115, 215	1-214-136-00	Ⓐ	1.5k	1%	metal oxide
R116, 216	1-214-150-00	Ⓐ	5.6k	1%	metal oxide
R119, 219	1-244-881-00	Ⓐ	2.2k	½W	
R120, 220	1-214-172-00	Ⓐ	47k	1%	metal oxide
R126, 226	1-214-110-00	Ⓐ	120	1%	metal oxide
R130, 230	1-214-148-00	Ⓐ	4.7k	1%	metal oxide
R157, 257	1-214-140-00	Ⓐ	2.2k	1%	metal oxide
R301	1-214-124-00	Ⓐ	470	1%	metal oxide
R302, 303	1-214-130-00	Ⓐ	820	1%	metal oxide
R304	1-214-124-00	Ⓐ	470	1%	metal oxide
R309	⚠1-212-857-00	Ⓐ	10		fusible
R322, 323	⚠1-212-881-00	Ⓑ	100		fusible
R327, 328	1-244-865-00	Ⓐ	470	½W	
R329	1-244-881-00	Ⓐ	2.2k	½W	
R607	1-244-857-00	Ⓐ	220	½W	
R610	1-214-170-00	Ⓐ	39k	1%	metal oxide
R613	1-214-177-00	Ⓐ	75k	1%	metal oxide
R650, 651	⚠1-217-465-00	Ⓑ	0.47	1W	fusible
R709, 710	⚠1-217-469-00	Ⓑ	1	1W	fusible
R801	⚠1-247-192-00	Ⓐ	10	½W	(nonflammable)
R802	⚠1-247-131-00	Ⓐ	1k		(nonflammable)
R803	⚠1-247-192-00	Ⓐ	10	½W	(nonflammable)
R804	⚠1-247-131-00	Ⓐ	1k		(nonflammable)
R805	⚠1-247-212-00	Ⓐ	68	½W	(nonflammable)
R808	⚠1-217-418-00	Ⓑ	0.47	½W	fusible
R809	⚠1-247-131-00	Ⓐ	1k		(nonflammable)
R812	⚠1-247-184-00	Ⓐ	2.2	½W	(nonflammable)
R813	⚠1-247-121-00	Ⓐ	390		(nonflammable)
R837	⚠1-247-119-00	Ⓐ	330		(nonflammable)
R1001	⚠1-206-696-00	Ⓑ	22k	2W	metal oxide (nonflammable)
RV001	1-224-644-XX	Ⓑ	4.7k, adjustable; gain		
RV101, 201	1-224-962-00	Ⓕ	20kΩ/20kΩ-A, variable; MIC		
RV102, 202	1-224-962-00	Ⓕ	20kΩ/20kΩ-A, variable; LINE		

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

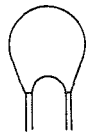
ACCESSORIES AND PACKING MATERIALS

Part No.	*Description*
X-3701-105-0	Ⓐ Tip Ass'y, head-cleaning
1-551-734-11	Ⓑ Cord, connection; RK-74A
3-562-684-00	Ⓑ Cushion, bottom (AEP, E model)
3-562-685-00	Ⓑ Cushion, front-top (AEP, E model)
3-562-686-00	Ⓑ Cushion, rear-top (AEP, E model)
3-562-692-00	Ⓐ Board, protection
3-562-708-00	Ⓔ Carton (AEP, E model)
3-562-709-00	Carton (Canadian model)
3-562-713-00	Cushion, top (Canadian model)
3-562-714-00	Cushion, bottom (Canadian model)
3-701-630-00	Ⓐ Bag, plastic (printed matters)
3-770-881-11	Ⓔ Manual, instruction (AEP, E model)
3-770-881-21 3-794-490-31	Ⓙ Manual, instruction (Canadian model)
3-793-828-11	Ⓑ Tag, cassette caution
3-794-468-11	Ⓑ Tag, EJECT-button caution
4-837-003-00	Ⓓ Bag, protection (set)

MYLAR CAPACITORS Ⓐ

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

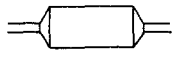
CAP. (μF)	RATING 50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.
0.001	1-108-227-00	1-108-365-00	1-108-409-00	0.01	1-108-239-00	1-108-377-00	1-108-421-00	0.1	1-108-251-00	1-108-389-00	1-108-433-00
0.0012	1-108-351-00	1-108-366-00	1-108-410-00	0.012	1-108-357-00	1-108-378-00	1-108-422-00	0.12	1-108-363-00	1-108-390-00	1-108-434-00
0.0015	1-108-228-00	1-108-367-00	1-108-411-00	0.015	1-108-240-00	1-108-379-00	1-108-423-00	0.15	1-108-252-00	1-108-391-00	1-108-435-00
0.0018	1-108-352-00	1-108-368-00	1-108-412-00	0.018	1-108-358-00	1-108-380-00	1-108-424-00	0.18	1-108-364-00	1-108-392-00	1-108-436-00
0.0022	1-108-230-00	1-108-369-00	1-108-413-00	0.022	1-108-242-00	1-108-381-00	1-108-425-00	0.22	1-108-254-00	1-108-393-00	1-108-437-00
0.0027	1-108-353-00	1-108-370-00	1-108-414-00	0.027	1-108-359-00	1-108-382-00	1-108-426-00	0.27	1-108-854-00	–	–
0.0033	1-108-232-00	1-108-371-00	1-108-415-00	0.033	1-108-244-00	1-108-383-00	1-108-427-00	0.33	1-108-855-00	–	–
0.0039	1-108-354-00	1-108-372-00	1-108-416-00	0.039	1-108-360-00	1-108-384-00	1-108-428-00	0.39	1-108-856-00	–	–
0.0047	1-108-234-00	1-108-373-00	1-108-417-00	0.047	1-108-246-00	1-108-385-00	1-108-429-00	0.47	1-108-857-00	–	–
0.0056	1-108-355-00	1-108-374-00	1-108-418-00	0.056	1-108-361-00	1-108-386-00	1-108-430-00				
0.0068	1-108-237-00	1-108-375-00	1-108-419-00	0.068	1-108-249-00	1-108-387-00	1-108-431-00				
0.0082	1-108-356-00	1-108-376-00	1-108-420-00	0.082	1-108-362-00	1-108-388-00	1-108-432-00				



TANTALUM CAPACITORS

→: Use the high voltage rated one.

CAP. (μF)	RATING 3.15 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	25 VOLT. PART No.	35 VOLT. PART No.
0.01					→	→	1-131-396-00 Ⓑ
0.015						→	1-131-397-00 Ⓑ
0.022						→	1-131-398-00 Ⓑ
0.033						→	1-131-399-00 Ⓑ
0.047						→	1-131-400-00 Ⓑ
0.068					→	→	1-131-401-00 Ⓑ
0.1					→	→	1-131-402-00 Ⓑ
0.15					→	→	1-131-403-00 Ⓑ
0.22					→	→	1-131-404-00 Ⓑ
0.33					→	1-131-409-00 Ⓑ	1-131-405-00 Ⓑ
0.47	–	–	–	–	1-131-412-00 Ⓑ	→	1-131-406-00 Ⓑ
0.68	–	–	–	1-131-415-00 Ⓑ	→	1-131-410-00 Ⓑ	1-131-407-00 Ⓑ
1.0	–	–	1-131-418-00 Ⓑ	–	1-131-413-00 Ⓑ	→	1-131-408-00 Ⓑ
1.5	–	1-131-421-00 Ⓑ	–	1-131-416-00 Ⓑ	→	1-131-411-00 Ⓑ	1-131-348-00 Ⓑ
2.2	1-131-424-00 Ⓑ	–	1-131-419-00 Ⓑ	–	1-131-414-00 Ⓑ	1-131-355-00 Ⓑ	1-131-349-00 Ⓑ
3.3	–	1-131-422-00 Ⓑ	–	1-131-417-00 Ⓑ	1-131-362-00 Ⓑ	1-131-356-00 Ⓑ	1-131-350-00 Ⓑ
4.7	1-131-425-00 Ⓑ	–	1-131-420-00 Ⓑ	1-131-369-00 Ⓑ	1-131-363-00 Ⓑ	1-131-357-00 Ⓑ	1-131-351-00 Ⓒ
6.8	–	1-131-423-00 Ⓑ	1-131-376-00 Ⓑ	1-131-370-00 Ⓑ	1-131-364-00 Ⓑ	1-131-358-00 Ⓒ	1-131-352-00 Ⓒ
10	1-131-426-00 Ⓑ	1-131-383-00 Ⓑ	1-131-377-00 Ⓑ	1-131-371-00 Ⓑ	1-131-365-00 Ⓒ	1-131-359-00 Ⓒ	1-131-353-00 Ⓓ
15	1-131-390-00 Ⓑ	1-131-384-00 Ⓑ	1-131-378-00 Ⓑ	1-131-372-00 Ⓑ	1-131-366-00 Ⓒ	1-131-360-00 Ⓓ	–
22	1-131-391-00 Ⓑ	1-131-385-00 Ⓑ	1-131-379-00 Ⓒ	1-131-373-00 Ⓒ	1-131-367-00 Ⓓ		
33	1-131-392-00 Ⓑ	1-131-386-00 Ⓒ	1-131-380-00 Ⓒ	1-131-374-00 Ⓓ			
47	1-131-393-00 Ⓒ	1-131-387-00 Ⓒ	1-131-381-00 Ⓓ	–			
68	1-131-394-00 Ⓑ	1-131-388-00 Ⓒ	–	–			
100	1-131-395-00 Ⓓ	–	–	–			



TANTALUM CAPACITORS

CAP. (μF)	RATING 3 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	35 VOLT. PART No.
0.033						1-131-273-00 Ⓔ
0.047						1-131-274-00 Ⓔ
0.068						1-131-275-00 Ⓔ
0.1						1-131-276-00 Ⓓ
0.15						1-131-277-00 Ⓓ
0.22			–	–	1-131-262-00 Ⓓ	1-131-278-00 Ⓓ
0.33			–	–	1-131-263-00 Ⓓ	1-131-279-00 Ⓓ
0.47			1-131-169-00 Ⓓ	–	1-131-264-00 Ⓓ	1-131-280-00 Ⓓ
0.68			–	1-131-258-00 Ⓓ	1-131-265-00 Ⓓ	1-131-281-00 Ⓓ
1.0			1-131-254-00 Ⓓ	–	1-131-266-00 Ⓓ	1-131-282-00 Ⓓ
1.5		1-131-250-00 Ⓓ	–	–	1-131-267-00 Ⓓ	1-131-283-00 Ⓔ
2.2		–	–	1-131-259-00 Ⓓ	1-131-268-00 Ⓓ	1-131-284-00 Ⓔ
3.3		–	1-131-255-00 Ⓓ	–	1-131-269-00 Ⓓ	–
4.7		1-131-251-00 Ⓔ	1-131-171-00 Ⓓ	–	1-131-270-00 Ⓓ	–
6.8		–	–	1-131-260-00 Ⓓ	1-131-271-00 Ⓔ	–
10	–	–	1-131-256-00 Ⓓ	–	1-131-272-00 Ⓔ	–
15	–	1-131-252-00 Ⓓ	–	1-131-261-00 Ⓔ		
22	–	–	1-131-257-00 Ⓔ	–		
33	1-131-176-00 Ⓓ	1-131-253-00 Ⓔ	1-131-173-00 Ⓒ	–		
47	1-131-288-00 Ⓕ	1-131-174-00 Ⓓ	–	–		
100	1-131-177-00 Ⓓ					

ELECTROLYTIC CAPACITORS

Note: Circled letter (Ⓐ to Ⓩ) are applicable to European models only.

RATING → : Use the high voltage rated one.

CAP. (μF)	6.3 VOLT.	10 VOLT.	16 VOLT.	25 VOLT.	35 VOLT.	50 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.47					→	1-121-726-00 Ⓐ
1.0					→	1-121-391-00 Ⓐ
2.2					→	1-121-450-00 Ⓐ
3.3	→	→	→	1-121-392-00 Ⓐ	→	1-121-393-00 Ⓐ
4.7	→	→	→	1-121-395-00 Ⓐ	→	1-121-396-00 Ⓐ
10	→	→	1-121-651-00 Ⓐ	1-121-398-00 Ⓐ	→	1-121-738-00 Ⓐ
22	→	→	1-121-479-00 Ⓐ	1-121-480-00 Ⓐ	1-121-662-00 Ⓐ	1-121-152-00 Ⓐ
33	→	→	1-121-403-00 Ⓐ	1-121-404-00 Ⓐ	1-121-652-00 Ⓑ	1-121-405-00 Ⓐ
47	→	1-121-352-00 Ⓐ	1-121-409-00 Ⓐ	1-121-410-00 Ⓐ	1-121-653-00 Ⓑ	1-121-411-00 Ⓐ
100	→	1-121-414-00 Ⓐ	1-121-415-00 Ⓐ	1-121-416-00 Ⓐ	1-121-357-00 Ⓑ	1-121-417-00 Ⓑ
220	1-121-419-00 Ⓑ	1-121-420-00 Ⓑ	1-121-421-00 Ⓐ	1-121-422-00 Ⓑ	1-121-261-00 Ⓒ	1-121-423-00 Ⓑ
330	1-121-751-00 Ⓑ	1-121-805-00 Ⓑ	1-121-521-00 Ⓒ	1-121-654-00 Ⓑ	1-121-655-00 Ⓓ	1-121-656-00 Ⓒ
470	1-121-424-00 Ⓑ	1-121-425-00 Ⓒ	1-121-426-00 Ⓒ	1-121-733-00 Ⓑ	1-121-361-00 Ⓔ	1-121-810-00 Ⓓ
1000	–	1-121-736-00 Ⓒ	1-121-245-00 Ⓓ	1-121-657-00 Ⓓ	1-121-388-00 Ⓔ	1-123-061-00 Ⓕ
2200	1-121-658-00 Ⓑ	1-121-659-00 Ⓒ	1-121-660-00 Ⓓ	1-123-067-00 Ⓕ	1-121-984-00 Ⓕ	–
3300	1-121-661-00 Ⓓ	1-123-075-00 Ⓔ	1-123-071-00 Ⓕ	–	–	–

CAP. (μF)	100 VOLT.	160 VOLT.	250 VOLT.	350 VOLT.
	PART No.	PART No.	PART No.	PART No.
0.47	–	–	–	–
1.0	1-123-249-00 Ⓐ	1-123-252-00 Ⓐ	1-123-003-00 Ⓑ	1-121-168-00 Ⓑ
2.2	1-123-250-00 Ⓐ	1-123-026-00 Ⓑ	–	1-123-028-00 Ⓑ
3.3	1-121-995-00 Ⓐ	–	1-123-004-00 Ⓑ	1-123-006-00 Ⓒ
4.7	1-123-255-00 Ⓐ	1-121-246-00 Ⓑ	1-121-759-00 Ⓑ	1-123-007-00 Ⓓ
10	1-121-126-00 Ⓑ	1-121-999-00 Ⓑ	1-123-254-00 Ⓒ	1-123-008-00 Ⓓ
22	1-121-996-00 Ⓒ	1-123-253-00 Ⓒ	1-123-005-00 Ⓓ	1-123-022-00 Ⓓ
33	1-121-997-00 Ⓒ	1-121-757-00 Ⓒ	–	–
47	1-123-251-00 Ⓒ	1-121-919-00 Ⓒ	–	–
100	1-123-084-00 Ⓔ	–	–	–

CERAMIC CAPACITORS Ⓐ

RATING

CAP. (pF)	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (pF)	50 VOLT.	CAP. (μF)	50 VOLT.
	PART No.		PART No.		PART No.		PART No.
0.5	1-101-837-00	22	1-102-959-00	150	1-101-361-00	0.001	1-102-074-00
0.75	1-101-586-00	24	1-102-960-00	160	1-101-367-00	0.0012	1-102-118-00
1.0	1-102-934-00	27	1-102-961-00	180	1-102-976-00	0.0015	1-102-119-00
1.5	1-101-576-00	30	1-102-962-00	200	1-102-977-00	0.0018	1-102-120-00
2.0	1-102-935-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00
3	1-102-936-00	36	1-102-964-00	240	1-102-979-00	0.0027	1-102-122-00
4	1-102-937-00	39	1-102-965-00	270	1-102-980-00	0.0033	1-102-123-00
5	1-102-942-00	43	1-102-966-00	300	1-102-981-00	0.0039	1-102-124-00
6	1-102-943-00	47	1-101-880-00	330	1-102-820-00	0.0047	1-102-125-00
7	1-102-944-00	51	1-101-882-00	360	1-102-821-00	0.0056	1-102-126-00
8	1-102-945-00	56	1-101-884-00	390	1-102-822-00	0.0068	1-102-127-00
9	1-102-946-00	62	1-101-886-00	430	1-102-823-00	0.0082	1-102-128-00
10	1-102-947-00	68	1-101-888-00	470	1-102-824-00	0.01	1-102-129-00
11	1-102-948-00	75	1-101-890-00	510	1-101-059-00	0.022	1-101-005-00
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.047	1-101-006-00
13	1-102-950-00	91	1-102-972-00	680	1-102-116-00		
15	1-102-951-00	100	1-102-973-00	820	1-102-117-00		
16	1-102-952-00	110	1-102-815-00				
18	1-102-953-00	120	1-102-816-00				
20	1-102-958-00	130	1-101-081-00				

0.001μF = 1,000pF

CERAMIC (SEMICONDUCTOR) CAPACITORS Ⓐ

RATING → : Use the high voltage rated one.

CAP. (μF)	25 VOLT.	50 VOLT.	CAP. (μF)	25 VOLT.	50 VOLT.
	PART No.	PART No.		PART No.	PART No.
0.001	→	1-161-039-00	0.018	1-161-016-00	1-161-054-00
0.0012	→	1-161-040-00	0.022	1-161-017-00	1-161-055-00
0.0015		1-161-041-00	0.027	1-161-018-00	1-161-056-00
0.0018		1-161-042-00	0.033	1-161-019-00	1-161-057-00
0.0022		1-161-043-00	0.039	1-161-010-00	1-161-058-00
0.0027	→	1-161-044-00	0.047	1-161-021-00	1-161-059-00
0.0033	→	1-161-045-00	0.056	→	1-161-060-00
0.0039	→	1-161-046-00	0.068	→	1-161-061-00
0.0047	→	1-161-047-00	0.082	1-161-024-00	1-161-062-00
0.0056	→	1-161-048-00	0.1	1-161-025-00	1-161-063-00
0.0068	→	1-161-049-00			
0.0082	1-161-012-00	1-161-050-00			
0.01	1-161-013-00	1-161-051-00			
0.012	→	1-161-052-00			
0.015	1-161-015-00	1-161-053-00			

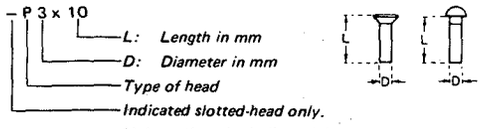
1/4 WATT CARBON RESISTORS Ⓐ

Note: Circled letter Ⓐ is applicable to European models only.

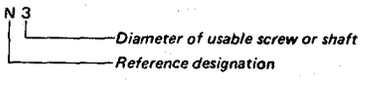
Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-576-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-577-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-578-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-579-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-580-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-581-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-582-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-583-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-584-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-585-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-586-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-587-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	